



**AGENCY FOR  
INTERNATIONAL  
DEVELOPMENT**

**COUNTRY FIELD SUBMISSION  
FY 1971**

**INDIA  
ANNEX O AND P**

**DEPARTMENT  
OF  
STATE**

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## FY 1971 COUNTRY FIELD SUBMISSION

### ANNEX ② - NUTRITION

I. Background: Beginning its program in 1966, the Mission's initial nutrition objective was to try to help introduce an awareness of the implications of malnutrition into the national consciousness. Review of Indian nutrition data and discussions with scientists revealed that, aside from sheer calories, the three major deficiencies were protein (suffered by the majority of Indian children); iron (nearly every Indian woman is anemic) and vitamin A (at least 2 million cases of blindness due to vitamin A deficiency).

In attacking these problems, emphasis was placed on activities which promised quick payoff and high visibility. A decision was made to concentrate on fortification, involvement of the private food-pharmaceutical industries, and the (ongoing) child feeding program. Traditional activities such as applied nutrition were ruled out in part because other agencies were already involved and in part because given limited resources, the Mission questioned whether these approaches provided the best pay-off.

The Mission believes it has been generally successful in helping promote awareness of nutritional problems and a government-industry commitment to attack them. The number of speeches by high Government of India officials, the frequency of newspaper and magazine articles on the subject and the interest and related actions of the private sector, all reflect a newly found genuine concern for the problem. In a more formal sense this acceptance is demonstrated by the introduction by India of a Protein Resolution in the Fall 1968 session of the UN General Assembly and the inclusion for the first time of a special section devoted to nutrition in the Five-Year Plan. This expresses a kind of national policy and a Rs 60 crore program.\*

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\*The policy statement and programmed detail of the nutrition section of the plan lacks the precision which would be desirable in future programming, but it should be noted that the mere presence of this section probably is the first time any country as ever had anything approximating a national nutrition policy or a national nutrition program. It is unfortunate that in the editing down process (in verbiage, not in money) much of the thinking of the committee's earlier draft was deleted.

The growing GOI commitment to addressing nutrition problems implies a change of course for the Mission nutrition program. The primary question no longer is: how do we best create an awareness of the importance of nutrition? The primary question is: to what goal or goals should our and the GOI's nutrition program be directed to ensure maximum benefits for India. Once the goals are selected and agreed upon, the task is to build a sustained, coordinated program addressed to their achievement.

II. The Aims: The Mission proposes to focus on two basic goals:

- 1) Complement Indian efforts to reduce population growth and improve its human resources with experimental and operational programs aimed at reducing infant and child mortality and improving the health of pre-school age children and pregnant and lactating mothers.\*
- 2) Reduce specific nutritional deficiencies affecting the general population (not just the above groups) through low-cost, technologically inspired improvements in diets.

III. The Aims Explained: India's population problem is both quantitative and qualitative. Its denominator is quantity - too many people. Its numerator is quality - many malnourished, illiterate, unproductive persons. Attention in recent years has been focussed mostly on the quantity problem. Yet improving the quality of India's human resources remains central to the achievement of her development aspirations. The theme of this annex is that nutrition is important to both the quantitative and qualitative side of India's population problem. The rationale for concentrating the nutrition program on reducing infant deaths and improving the health of pre-school children and P.-L. mothers is that such a program is likely to yield significant dividends, not only to the actual beneficiaries, but to India's effort to curb its population growth and strengthen its human resources. Explanation of these follows:

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\* Henceforth referenced to as P.-L. mothers.

A. GOAL I: Complement Indian efforts to reduce population growth and improve its human resources with experimental and operational programs aimed at reducing infant and child mortality and improving the health of pre-school age children and pregnant and lactating mothers

1. Family Planning: Of the multitude of factors which influence family size, attention in India is being increasingly focussed on the continuing high infant-child death rates and the Indian preference for sons. These two are the foundation stones of a thesis which runs roughly as follows:

Indian families want at least one and preferably two sons. Sons are prized partly for deep-seated religious and cultural reasons, but primarily for the economic support they can provide parents in their old age. In an agrarian society which lacks social security, sons provide the means of old age support. Death rates in India have, of course, fallen since independence, but the child death rate has not fallen nearly as fast as the general death rate. Statistics are not complete, but (a conservatively estimated) 20-25% of all Indian children may die before they reach the age of five. Up to 15% may die in infancy. As long as these high death rates prevail, therefore, Indians will find it in their interest to bear large families to insure the survival of at least one son.

Evidence to support this thesis is not comprehensive nor definitive, but is beginning to build:

- 1) Two studies cited in the PSAC report. In Cairo, Egypt, mothers 45 to 49 years old were subdivided into ten groups according to five levels of educational attainment and according to whether they had experienced the death of one or more of their children. In each of the five educational classes, those women who had experienced one or more child deaths had born a considerably higher number of children than those who had not experienced such a death. Mothers of all ages who had lost one or more children tended to desire a larger number of children who would be alive when the mother reached age 50 than did mothers who had not lost a child.

In a study comparing districts in Ceylon, Mauritius, and British Guinea, the five districts with the highest pre-1950 mortality rates in each country were compared with the five districts having the lowest pre-1950 mortality. In all three countries, ~~these~~ <sup>yes, these</sup> districts with relatively high mortality and a low rate of natural increase prior to 1950 experienced a rise in birth rate in recent years. In Ceylon and Mauritius, the districts with relatively low mortality and a high rate of natural increase prior to 1950 showed a marked decline in the birth rate in 1960 and 1964 respectively. In British Guinea, there was no data after 1955. In that year the birth rate for the low mortality districts was slightly higher than it had been in 1945-49, but the percentage increase of birth rates was much smaller than in the districts where the 1945-49 mortality was relatively high.

The PSAC concluded that "low infant and child mortality, and public awareness that mortality is low, seems to be one of the necessary conditions.....for reducing fertility." <sup>1</sup>

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- 1 The World Food Problem: A Report of the President's Science Advisory Committee, The White House, Washington, D. C. Vol. II, May 1967, pp. 34-35, which reference the Cairo study S. Hassan, in paper presented at annual meeting Population Assn. American, New York City April 1966, "Influence of Child Mortality on Fertility"; and the intra-country study, H. Frederikson, "Determinants and Consequences of Mortality and Fertility Trends", Public Health Reports 81(8):715-727, August 1966.

2. A study by Thomas Poffenberger of a village in Gujarat<sup>2</sup> concluded that "families continued to have children until they were reasonably certain that at least one boy would survive. Once they had this number, they attempted to stop having more." The primary reason the parents desired sons was for old age security.
3. A computer-simulation<sup>3</sup> run showed that with India's current estimated infant and adult death rates, a couple must bear 6.3 children if they are to be 95% certain that one son will be surviving at the father's 65th birthday. The average number of births in India per couple is 6.5 which tends to support the thesis that parents do continue to bear children until reasonably sure of the survival of at least one son.
4. Persons who accept family planning in India are generally those with large enough families to assure the survival of at least one son. Studies show that sterilization acceptors have an average of 4-5 living children and an average of 2-3 sons versus 1-2 daughters.
5. An intensive study of 12,000 persons at Khanna in the Punjab revealed that up to 33% of children died before their second birthday and that 85% of women over 40 years old had lost at least one child. The study concluded that child death rates were the most important obstacle to the practice of contraception.

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2 Thomas Poffenberger, "Husband-Wife Communication and Motivational Aspects of Population Control in an Indian Village." Department of Child Development, Univ. of Baroda, Gujarat, 1968, pp: 45-46.

3 May, David A and Heer, Dav M, "Son Survivorship Motivation and Family Size in India": A computer simulation, unpublished manuscript, 1967, p. 13.

The study cited infant infections attending delivery and diseases relating to malnutrition as the main causes of death. About 30% of deaths in the first month were from tetanus, readily preventable by inoculation of the mother before delivery. About 40% of deaths occurring between the ages of 28 days and one year were directly related to malnutrition either from lack of protein supplementing breast milk or from unsterile supplemental weaning food or practices.<sup>4</sup>

Although this is a single study, covering only 12,000 people in all villages, the source of the tetanus infection is common to midwifery practices throughout much if not most of rural India: Cut the umbilical cord with a sickle and plaster the wound with cowdung or ash. Similarly, the coincidence of the onset of the diarrheal disease with the introduction of supplementary food under conditions which are almost equally unsanitary throughout India's villages suggest that the incidence and the rate of infant mortality due to this cause is likely to be the rule even in villages not so microscopically examined.

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4 John E. Gorden and John B. Wyon, "Families and Population Problems in Rural North India: The Khanna Study." Unpublished manuscript, 1969, Chapter 7, pp. 70-73, and John E. Gorden, Sohan Singh, and John B. Wyon, "Causes of Death at Different Ages by Sex, and by Season, in a Rural Population of the Punjab, 1957-1959: A Field Study," Indian Journal of Medical Research, Vol. 53, No. 9 September 1965, pp. 906-917.

Additional evidence of the relationship of malnutrition to infant mortality and morbidity is found in a study carried out by the Institute for Nutrition for Central America and Panama in several rural villages in Guatemala in 1960-1963. The study measured differences in neonatal and post neonatal deaths in two highland villages during the first year of life, in which most of the infants (and children) of one village received daily food supplements for a period of four years. The infant mortality rate in the feeding project dropped from 186 per thousand live births (which was the rate during the period 1950-1960) to 83 during the period 1960 to May 1963 as compared with 179 and 187 respectively in the control village. More dramatically, however, the post-neonatal death rate--that is, among infants 29 days to 11 months inclusive--dropped from 113 to 18.5 per thousand during this period, as compared with 94 and 106 respectively in the control location.

The above evidence--while impressive--is not, of course, an assurance that lowering of infant death rates will result in a decline in fertility. There are a number of determinants of family size. Lowering of death rates alone may not be sufficient to bring about a decline in fertility. But the evidence does point toward the conclusion that without a lowering of the infant/child death rate, people will not limit their families.

The linkage of nutrition and family planning does not stop with programs to reduce the birth rate. There is some consensus that the effectiveness of the family planning program could be much enhanced by complementing it with an effective maternal and child health program. The thesis is threefold: Firstly, that mothers will be much more willing to listen to the advice of family planning workers if the family planning message is presented in a context of total concern for the family-concern

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5 Summarized, with tables in Chapter 6, "The effect of the interaction of nutrition and infection on the pre-school child", Nevin Scrimshaw, in Pre-School Child Malnutrition: Primary Deterrent to Human Progress - An International Conference on Prevention of Malnutrition in the Pre-School Child, Washington, D. C., Dec. 7-11, 1964, published by National Academy of Sciences, National Research Council, Publication 1282, Washington, D. C. 1966, pp: 63-73.

for living children and not just for preventing children; secondly, that the availability of better health services will increase the mother's confidence that her living children can be cured should they get sick and thus render her more willing to limit her family; thirdly, that doctors, nurses, and auxiliary nurse midwives, trained to preserve life, resent and reject employment which requires them to encourage the termination of fertility without being provided the bare essentials to improve the well-being of children already born. The thought here is that complementing family planning with MCH services will improve the morale and effectiveness of workers.

The GOI has expressed a commitment to expand its MCH services to complement and fortify its family planning program. The U.N. report has endorsed this strategy and the Mission -- as part of its family planning program -- will seek to assist. Nutritional inputs can play a significant role in the development of a more effective MCH service. The Mission's nutrition program will, therefore, be coordinated with the family planning program in this effort.

In terms of family planning, therefore, the Mission decision to focus its nutritional program on infants and children has two justifications. Firstly, reducing the infant-child death rate may remove a significant barrier to family planning acceptance. Secondly, nutrition coupled with medical and other programs in an effective MCH service may help create a climate of concern which will increase the effectiveness of the family planning program.

It must be stressed that there is no conclusive evidence to support these hypotheses. But they provide important backing for the decision to concentrate on pre-school children and P.L. mothers.

2. Human Resources: There is some evidence that deficiency of protein may have a bearing on physical capacity, learning capacity, attitudes and aspirations.

As developed in III B below, the prime determinant of nutritional status for the population as a whole is income. With increased income comes the ability to purchase a larger bulk of food and frequently (but not always) a larger proportion of nutritionally superior foods. For the adult population an adequate supply of food (meeting caloric requirements) will generally provide the nutrients needed for sustenance and/or growth -- protein, vitamins and minerals.

For the pre-school age children and the P.L. mothers\*, this is not likely to be the case. The proportionately (per body weight)

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greater requirements of this group for these nutrients means that their intake will not automatically be met by higher incomes and more food. Evidence cited below suggests that the consequences of not attending to these groups may have serious developmental implications.

Simply stated, the Mission's concern is based on a twofold proposition: first that the vast majority of Indian pre-school age children and P. L. mothers suffer from severe deficiencies in the essential nutrients; secondly that these deficiencies have a direct bearing on physical capacity, learning capacity, attitudes and aspirations.

Each of the prime nutrient deficiencies in these groups appears to be taking its own toll. Several million cases of preventable blindness in India are the result of Vitamin A deficiency in the pre-school years. Iron deficiency, aside from its enormous mortality toll particularly of mothers during child-bearing, results in chronic apathy and listlessness.

More important than either in terms of its suspected developmental consequences, is the deficiency of protein among these groups. The syndrome among infants in low income developing societies is now well documented worldwide: the mother having no access either to milk or prepared baby foods begins feeding solid food, but in unsanitary fashion. The result is gastrointestinal infection and diarrhea. The alarmed mother responds in traditional fashion by diluting these solid foods and eliminating protein-rich pulses mistakenly identified as the source of the problem. This decrease in nutrient intake now leaves the infant wholly incapable of dealing with the infection which has concurrently increased metabolic demands and inhibited what little nutrient absorption might have been possible from the food intake. The result is severe malnutrition which is frequently fatal.<sup>6</sup>

The effects of protein deficiencies among children have been receiving increased attention over the past several years. Efforts on

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<sup>6</sup> J. E. Gordon, I. D. Chitkara, J. B. Wynon, Amer. J. Med. Sci. 245, 345 (1963).

physical growth and capacity have long been established and are sufficiently self-evident to require no further elaboration here. What is of greater developmental significance is the possible effect of such childhood deficiencies on mental capacity, learning and attitudes.

Recent animal studies have largely confirmed the pioneering work of Cravioto on the protein deficiency-brain growth relationship. Cowley and Griesel conclude that such deficiency during the period of most rapid brain growth produces a brain which is not only smaller than control animals but also one which matures bio-chemically and functionally at a slower rate.<sup>7</sup> Similar conclusions were reached by Chase, Dorsey and McKhann.<sup>8</sup>

Tests on humans are by definition far more difficult. Nonetheless, several studies have been and are being attempted. Work by Cabak and Najdanvic indicates that the intellectual attainments of children who have suffered from severe malnutrition in infancy are consistently lower than those of individuals with adequate nutrition.<sup>9</sup> This work and that done by Nobles and Ramos-Galvan further suggests that less severe forms of infant malnutrition may also result in slower intellectual development.

Two basic questions emerge from these studies. The first is the degree to which brain damage resulting from malnutrition might be repaired by subsequent treatment. The evidence here is mixed (although animal testing indicates frequent irreparable damage). The question here, of course, is the likelihood of such treatment or rehabilitative feeding or eating ever taking place. In the Indian context, the chances are slim.

A more important question is the degree to which such brain damage will be a drain on individual and subsequently national development. This is not only a sensitive subject but also one particularly difficult to quantify in a controlled situation. Nonetheless Cravioto and Valenzuela, Peniche and Macias were able to identify a definite apathy and lack of curiosity among children who had suffered such deficiencies. As compared to normal children of similar ages they

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7 J. J. Cowley and R. D. Griesel, *J. Genet. Psychol.* 103, 233 (1963).

8 H. P. Chase, J. Dorsey, G. M. McKhann, *Pediatrics* 40, 551 (1967).

9 V. Cabak and R. Najdanvic, *Arch. Dis. Children* 40, 532 (1965).

also responded sluggishly, if at all, to a variety of stimuli. Continuing observations of these children have indicated that they never catch up mentally or physically with their healthy peers. From this evidence plus data on worldwide protein availability, Keppel estimated that this "apathy, typical of chronic protein deficiency, an apathy which translates into diminished learning potential, . . . affects 350 million children, 7 out of every 10 children under the age of six in the entire world.<sup>10</sup>

This evidence cannot yet be considered conclusive and the Mission believes that it must be handled cautiously. There is no data on how widespread protein deficiency severe enough to cause irreparable brain damage is in India. There is no estimate as to what protein deficiency costs India in terms of lost productivity, creativity or foregone development. Yet these findings do reinforce, and render more compelling, the Mission's decision to concentrate its nutrition program primarily on children.

B. Goal II - Reducing Specific Nutritional Deficiencies Affecting the General Population through Low Cost, Technologically Inspired Qualitative Improvements in Diets: Malnutrition is pervasive in India. Review of Indian diet surveys shows a clear (and unsurprising) link between income and diet. The surveys indicate that per capita income must reach about Rs. 30-40 per month in order to achieve an acceptable diet. As income slides below this level, diet adequacy falls off depending on the individual's age, sex and location. Virtually all persons with an income of Rs. 15-18 per capita are malnourished.

About 80% of India's rural population and 60-70% of its urban population fall below the Rs. 30-40 income line. About 160 million people -- or one third of the population -- have incomes of Rs. 15-18 per capita per month.

The prospects that this malnourished mass will obtain better nutrition in the near future are not bright. Optimistically assuming real per capita income advances at 3% per year, it would take

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10. Malnutrition, Learning and Behavior, (Proceedings of an International Conference sponsored by the Nutrition Foundation, Inc., and M.I.T., March 1 to 3, 1967) page 5.

take about 30 years for those earning Rs. 15-18 per month to reach the required level. Yet this calculation ignores the fact that India's recent (and expected future) economic progress is not falling evenly among all groups. The Green Revolution has benefited certain sections of the country and certain groups more than others. The primary beneficiaries have been larger farmers with assured water supply. Although confirming data is scarce, there is ample reason to believe that large groups - very small farmers, dry-land farmers, landless laborers -- have either been left out or have participated only marginally in the gains derived from the new technology. The prospects that the 160 million core disadvantaged will remain malnourished for the foreseeable future are strong.

Given the size and geographic spread of the disadvantaged groups and the fact that lasting improvement in their nutritional status hinges on income increase which (under the most optimistic assumptions) can't be expected for a generation, a stop-gap poverty program which seeks to ease the nutritional problem of the group as a whole is not feasible. The costs would be excessive and outside the reach of both U. S. and GOI resources. But certain specific deficiencies may be curbed by relatively low-cost technical innovations. For instance, it may be possible to eliminate iron and calcium deficiencies through fortification of salt. The Mission believes that such innovations, where feasible, should be pursued. In addition, such measures may be the cheapest and easiest means of easing these same deficiencies among the principal target group.

Underlying all the discussion above - from human resources development to family planning - is an awareness of the humanitarian reasons which support a nutrition program. Hungry children do not usually have to justify their claim for sustenance on their supposed contribution to national development. There are strong moral imperatives which bid the Mission and the GOI address itself to this problem, not because its alleviation promises development benefits, but because it is there - because it is just and humanitarian to do so.

In addition, it is recognized that the existence of 160 million persons living on the edge of destitution is a potential source of social and political tension. In purely practical terms, means must be sought to better this group in order that their poverty does not explode into actions which could damage Indian economy or political stability. Part II, Section I of the CFS dwells on this problem and suggests that the Mission plans to explore extensive rural works, means to facilitate procurement of agricultural inputs, and expansion of primary education as means of dealing with this problem.

A nutrition program directed at children contributes to this end partly by supplementing family resources and partly by evidencing the GOI's concern to ameliorate the plight of the down-trodden.

IV. Program: An effective program to reduce infant death rates and improve the health of pre-school children and P. L. mothers implies a combination of three types of measures.

- health measures such as immunization, tetanus shots, parasite medicines;
- nutrition measures such as food fortification, feeding programs, production of weaning foods, nutrition education;
- agriculture measures such as breeding high-yielding varieties of protective foods or nutritionally improved cereals.

The task is to develop an integrated program - one that combines these various measures to best advantage. This section lists measures in each category which the Mission intends to pursue in the coming year. Some of these will be carried out by the Food and Nutrition Division alone; some will involve close coordination with the Health and Family Planning Division and the Office of Agriculture. The list is not complete nor is the relative priority between the various measures established. Developing a full arsenal of weapons and working out the relative weight of each remains the major programming task for the future - one that will depend both on the effectiveness of any given measure and such factors as resources, GOI receptivity and administrative capability.

In developing a set of measures, an additional programming question arises. Is the nutrition program to be aimed at the lowest income group, or a medium-low income group, or all children or whom? Tentatively, the Mission's conclusion is that it should concentrate on children in the medium-low income groups. This is because:

- 1) The costs of reaching the lowest income groups through feeding programs, or commercialized items of any kind would be considerably greater and probably prohibitive.
- 2) Nutritionally the lowest-level group is so deficient in food and calories per se, that nutrient supplements will have only marginal impact.

The various programs to be undertaken are:

A. Feeding and Child Care

1) Infant Feeding: The Mission in conjunction with the voluntary agencies, will seek to increase the number of pre-school children in the school feeding program as rapidly as possible. The Mission will also attempt to reach additional pre-school children through programs in nurseries, community centers and possibly MCH centers (see below).

The Mission recognizes, however, that the number of pre-school children who might be reached through non-school feeding points is small. (An estimated 5 million out of 80 million.) Thus the major feeding will have to be programmed through schools (for after-school feeding).<sup>11</sup>

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11 School Lunch: The Mission recognizes that the school lunch program, aimed largely at 6 to 12 year olds, does not fit the targets selected above. Yet most Indian states view the program as an important part of their educational program and major cut-backs, even if felt desirable, are not possible at this time. The Mission is currently undertaking a major study to determine the impact of the existing school feeding program. The returns of the pre-investigation pilot study reflected a number of procedural and methodological difficulties which have now been clarified and resolved for the study itself. The results of this study, it is hoped, will indicate the effects of the program on nutritional status, substitutability for food at home, effects of such substitutability on the well-being of younger siblings, and drop-out and absenteeism rates. With the results of such a study it will be possible to determine more accurately optimal school feeding recipient levels in the future. For the present no effort will be made to decrease the level of such recipients (as the pre-school category increases) for the following reasons:

- (1) Major cut-backs of existing school feeding programs would in most states be a political impossibility.
- (2) Schools cannot be utilized for pre-school feeding unless the school children are also fed.

2) MCH Services: A prime Mission aim is to strengthen the MCH services provided by the GOI's rural health/family planning facilities so as to complement and fortify the family planning program. The aim is to build a climate of concern which will better enable family planning workers to propagate family planning. Strengthening MCH centers may involve such measures as iron tablets, vitamins, tetanus inoculations, etc. It may also include nutrition, feeding programs, nutrition education, etc. The Nutrition Division will work with the Health and Family Planning Division in the development of this program.

The Mission recognizes that both MCH centers and schools are ill-equipped for large scale preschool feeding. The capacity of the existing rural health/family planning network to take on expanded responsibilities is clearly limited. Similarly, the GOI Ministry of Education has voiced objections to large scale preschool feeding at the schools in light of the time lost from teaching.

There appear to be two means of getting around these problems, both of which will be fully explored by the Mission during the coming year:

- (a) the provision of "ready-to-eat" foods delivered to the feeding sites from central kitchens using the Madras program model; or the utilization of extrusion and other pre-processing techniques.
- (b) the provision of weaning food (for the most part utilizable only by infants and young children) for distribution to young mothers and their children for preparation and consumption at home.

3) Bal Ahar: One of the continuing goals of the Mission's child feeding program has been to increase GOI involvement in the program. To institutionalize such continually increasing GOI participation, the Mission will attempt to increase as rapidly as possible the production of Bal Ahar. In the short run (the Fourth Plan), the product will be produced with a combination of U. S. (but locally available) and Indian ingredients, all of which are to be financed

directly or indirectly by the U.S. and processed, packaged, and distributed at GOI expense. Subsequently, it is projected that the GOI will assume increasing financial responsibility for the ingredients as well, unless it becomes clear that such financing would be done at the expense of increased production.

Current efforts to improve the nutritive value, storage life and acceptability of the product will continue until the product is considered fully satisfactory in each of these respects.

4) Parasites: The Mission hopes to address the problem of the mutually reinforcing malnutrition-infection syndrome. Recognizing that an attack on infection and particularly parasites requires a rather extensive (and expensive) package of environmental sanitation, the course of action usually recommended is the more feasible and less expensive one of attacking the syndrome at the malnutrition end. At the same time, it may be possible to launch at least a partial attack on the parasites themselves particularly in the context of a feeding program, by the periodic administration of inexpensive drugs, e. g. , Santonine, Alcopal or Piperazine. This requires careful investigation, but has the potential of significantly increasing the benefits of nutritional inputs at relatively low cost. In addition, it may be possible to make an additional dent on the syndrome by means of the educational approaches.

#### B. Fortification

Although fortification programs by definition are geared to the consumers of specific staples rather than to economic or age group target population segments, the Mission has concluded that at least in the case of certain nutrients and certain carriers, fortification of the entire supply of a staple is less expensive, frequently far less expensive than any program designed to reach the target group alone.

The Mission has found it convenient to distinguish between (1) fortification programs involving minimal increase in the cost of the staples which can be passed on to the consumer with minimal inconvenience and (2) those involving more substantial cost increase and thus requiring government subsidies. By definition the first category requires less rigorous economic analysis. If the benefits of such fortification outweigh the inconvenience to the consumer and the manufacturer and do not significantly add to the administrative

and inspection burdens of the government, they should be undertaken without question.

When the cost of fortification necessitates governmental subsidies, however, such programs must be compared with non-fortification means of accomplishing the same nutritional objective. Such a comparison in order to be effective would have to take into account not only local prices but also the cost in terms of utilizable nutrients, the cost of distribution including transport, storage and handling, the educational costs, foreign exchange costs and consumer acceptability. In addition, such a comparison would have to calculate positive and negative effects on other sectors of the economy and other developmental priorities.

The Mission has been attempting to quantify these factors to the extent possible for fortification and non-fortification avenues to permit rational comparisons. On the basis of comparative data on required financial outlays to meet specific target group deficiencies,<sup>12</sup> however, the Mission has in the interim opted to devote its prime attention to food fortification<sup>13</sup> as long as such programs effectively reach a significant portion of the target group. Such programs to the extent possible should also have some beneficial effects on the entire populace consuming the fortified product, but this is a secondary objective.

Looking at the range of fortification possibilities from these viewpoints, the choice among them becomes less difficult. Tea fortification with amino acids (nutrients which primarily benefit pre-school age children) may be unrealistic unless it can be shown that adequate amounts of tea are consumed by this group. (We are currently examining this on a nationwide basis.) Fortification of rice with any nutrients is probably premature in India given (1) the small percentage of consumers (roughly 5% unevenly scattered through the country) who cook their rice in ways which permit the

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12 See Comprehensive Nutrition Plan (TOAID A-1002).

13 This decision was of course also based on the relative ease and speed of implementing such programs. Given the almost total lack of prior Indian attention to the subject, the returns on effort invested have probably far exceeded those that might have accrued from any alternative nutritional investment.

retention of the added nutrients. Fortification of foods with lysine is currently being tested to specifically determine its effect on various pre-school-age diets.

Below are descriptions of the two fortification programs which appear to have the highest benefit-cost ratios in terms of the above-mentioned criteria, and which appear to compare most favorably with alternative non-fortification measures.

- 1) Salt Fortification -- Given the existence of a vehicle capable of reaching the entire populace, it becomes possible to think in terms of totally eliminating deficiencies nationwide. Those nutrients most suited to this medium appear to be iron and Vitamin A. Technologically both appear to be feasible. Physiologically they meet the two major deficiencies which are serious public health problems even beyond the pre-school age. In addition, these are the two major deficiencies which appear least affected by changes in income (and thereby affect productive potential and mortality among infants and children of higher income groups as well).

Economically, salt fortification falls into both the non-subsidy and subsidy categories. Fortification with iron plus calcium (the latter primarily to increase iron absorption) should add no more than 10% to the cost of salt. With the price of salt so low (Rs 1.50 per person per year), a 10% increase could probably be absorbed by the consumers or by the distribution mechanism. Vitamin A fortification, on the other hand, would require a substantial subsidy (Rs 20 crore per year), but nonetheless appears to be the least expensive means of meeting this deficiency for the entire target group.

The requirement here is intensified laboratory and field research assisted as necessary by U.S. expertise, and a policy commitment by the GOL.

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14 See TOAID A-494.

- 2) Atta Fortification -- While it is not possible to fortify salt with protein (other than with amino acids), protein concentrates from oilseeds and other sources can be used together with vitamins and minerals to fortify wheat atta ground in roller flour mills. The prime advantage of this carrier is its consumption by the lower income groups in urban areas. Thus at least in wheat eating urban areas much of the protein, vitamin and mineral requirements of the target group could be met by atta fortification.

Atta fortification appears to have the added benefit of being in the non-subsidy category although this is yet to be finally determined.

The requirement is effective implementation of a pilot effort in the largest cities followed by fortification in each of the 185 roller flour mills. Although much of the groundwork has already been laid, implementation will require additional technical assistance.

### C. Nutrition Education

Recognizing the importance of improved infant feeding practices, the Mission proposes to commence a series of activities designed to disseminate this and related information to mothers, children, teachers and MCH center personnel.

The focal point of this effort will be the feeding center, relatively easy to reach through the Title II pipeline, and capable of reaching almost immediately large numbers of target persons. The pre-school feeding program, through schools or MCH centers, with its captive audience of young mothers presents a prime opportunity to utilize this network for educational purposes. Similarly, education through schools will be reaching children who will themselves be parents a few years hence.

Beyond this effort, the Mission is considering and/or pursuing three other means it believes may be capable of high impact at low cost:

- (a) An umbrella nutrition education campaign directed to a single state and administered by the Protein Foods Association.
- (b) The incorporation of nutrition education messages into the advertising of private and public sector food firms engaged in the promotion of nutrition products.

Modern Bakeries' efforts along this line are already well advanced.

- (c) Development and reorientation of the Nutrition Publicity Unit in the Ministry of Food toward imaginative dissemination of the infant feeding message.

Each of these efforts will be based to a greater or lesser extent on basic background information the Mission is currently in the process of collecting, e. g. , how much is currently known, among which groups, which messages are most likely to encourage adoption of the practices advocated. With this information which the Mission hopes to procure through a series of local contracts, it should be possible to provide a solid conceptual base for the above activities.

#### D. Commercial Protein Foods

Given a prime target group which is above the lowest income category, and recognizing the increasing trend in the country toward urbanization, the Mission proposes to continue its efforts to develop a viable system of low-cost nutritious processed food development and commercialization. The efforts and experience of the past three years have provided (1) an entity, namely the Protein Foods Association, through which assistance can readily be provided, and (2) a better idea of those food items which are in fact capable of reaching the target group. Efforts in this area are thus twofold: (1) the strengthening of the Protein Foods Association and (2) massive commercialization of low-cost weaning foods.

##### a) Assistance to the PFA

The Mission's role as regards the Protein Foods Association should be twofold: (1) to strengthen that organization as a viable and useful entity for its membership and (2) to establish it as an effective link between the processed food industry and the Government.

The first involves the provision of services to the industry in the area of protein foods. With Mission assistance, the PFA plans to (1) procure and provide market information

and product development guidelines for each major geographic area of the country; (2) provide technical assistance in problem areas of processing (e. g. , flavoring, packaging, emulsification, etc. ); and (3) provide samples of protein supplements (e. g. , soy flours and FPC) for product development by the membership in advance of (and to help develop demand for) larger scale production. In addition, the Mission will explore means of guaranteeing off take of limited percentages of locally produced protein foods for utilization in the child feeding program.

To help establish the PFA as an effective Government-industry link the PFA will attempt, again assisted by USAID as appropriate, to provide services related to GOI programs and priorities. To help increase consciousness of the malnutrition problem, for example, the PFA is currently producing a film for national distribution and is planning an umbrella mass media campaign, initially for Tamil Nadu State. The PFA is also assisting the Government in the solution of several logistics problems related to atta fortification. At the same time, the PFA will attempt to develop a package of governmental support and incentives to further encourage the industry in the production of nutritious foods.

b) Stimulation of Weaning Food Production

On the basis of, and taking full advantage of infant feeding information dissemination discussed in IV-C above, the Mission envisages a program of massive production and commercialization of lowest cost (and if necessary bulk packaged) weaning food for large scale urban and rural distribution through fair price shops and other food grain outlets. The production of such weaning foods, which should sell for only slightly more than processed cereals, represents the major contribution to low-income group feeding which can be made at present by the processed food industry.

To assure broadest possible distribution and fullest governmental support, it is proposed to organize such a program through the Food Corporation (already planning such an effort independently) in conjunction with the Protein Foods Association. Such a program would itself require a major promotion effort which in turn would further increase consciousness of the need discussed in IV-C above.

E. Encouragement of Protective Foods Production

As a means of supporting the program objective as well as each of the preceding program components, the Mission will continue to devote attention and resources to the development of protective foods both for direct consumption and as ingredients for the fortified and processed foods discussed above. These programs will be coordinated closely between FAN and the Office of Agriculture. Priorities here are twofold:

a) Production of Processed Flours and Concentrates from Soybeans

In order to successfully carry out the fortification, Bal Ahar, and weaning food production programs discussed above, an improved source of low-cost vegetable protein will be necessary on a large scale. Up to now the only such source available for these processing purposes has been groundnut which presents problems of aflatoxin and ash and which has only fair protein quality. The Mission's longer range strategy (and one fully supported by UNICEF which has been deeply involved in oilseed processing here) is to gradually phase out the utilization of groundnut for such programs and replace it with soybeans as the production of this latter crop increases.<sup>15</sup> Soybean flours and concentrates present none of the toxicity or processing problems associated with groundnut products and are of considerably superior protein value. In addition, soy protein has already proven its acceptability as an ingredient in CSM.

The Mission proposes to aggressively pursue this objective through assistance both in soy processing and in the development of soy-based products.

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15. No mention has been made here of cottonseed protein in light of the processing difficulties and high costs encountered thus far in India. Should a suitable inexpensive process be developed for India (the Dorr-Oliver process offers such a hope), this strategy would be modified accordingly.

b) Development of High Yielding Varieties of Protective Foods, Particularly Pulses

The Mission should continue, and if possible accelerate its research on the development of high yielding varieties of pulses along the lines of the recently submitted PROP (Pulse Research Improvement) and other relatively low cost protective foods. Such yields would not only increase supply and reduce prices but would also make their production more profitable for the cultivator. Here as in program F below closest collaboration with the Mission's agriculture program will be necessary.

Beyond these, the Mission will also devote attention to the extension of the existing milk supply through toning at urban dairies with vegetable protein (the addition to the high fat buffalo milk of water and vegetable protein to maintain its protein content). This work will be carried out in conjunction with the National Dairy Development Board.

F. Increased Breeding of Cereals with Improved Nutritive Value

Of major value to the nutritional status of young children, and simultaneously to other segments of the population, would be increases in the protein content and quality of cereals through plant breeding. Considerable progress has already been made internationally with high lysine corn (now being tested on a large scale in Brazil and Colombia) and high protein wheat varieties. In India at least one high yielding wheat strain (Sharbati Sonora) when grown under high levels of nitrogen, has a protein content exceeding 16%. Other dwarf wheats, notably S.308, Lerma Rojo, Sonora 64 and S. 227 have shown protein contents exceeding 13%. These compare with protein contents of 8-10% in traditional Indian wheat strains. The lysine value of these strains is also notably higher than that of the traditional strains. In other grains, Cuba II J maize and Taichung Native rice with protein contents of 15.3% and 12.1% respectively (as opposed to traditional protein contents of 11% and 7%) have nearly 50% more protein than traditional strains.

In trying to put these percentage figures in the perspective of Indian protein requirements, the Mission has estimated that if Sharbati Sonora wheat replaced existing wheat strains on only 10% of the present wheat acreage in the country, the resulting increase in protein would be equal to the total protein deficiency of the low-income pre-school age target group (although initially the beneficiaries would, of course, be the families of the more progressive farmers utilizing such strains).

The Agriculture Annex (Annex F) describes Mission strategy in intensifying the breeding of cereals with higher nutrient content.

#### G. Research

Although the presence of malnutrition is well-known and its composition generally understood, its precise causes are not known with any certainty. To mount the attack on infant and child mortality and nutrient deficiencies, the Mission needs to know more about the determinants of the diets of pre-school children and P. L. mothers in different income classes. Field testing is also necessary to determine the potential effects of alternative programs on nutritional status and on family planning practice.

The Mission is considering two types of experiments:

- 1) An experiment to test the proposition that the provision of nutritional services can increase the drawing power of MCH centers and other family planning service points.

As suggested in III-A-1 above, there is some reason to believe that the GOI's efforts to promote contraception without simultaneous maternal and child health services has antagonized the potential contraceptors and decreased the effectiveness and morale of the workers. Several aspects of this proposition may be studied:

- a) What increase in drawing power can be expected by equipping family planning service points with maternal and child health services? (Non-nutritional health services will be arranged through the Mission's family planning program.)

- b) What increase in contraceptive usage is likely to occur from any such increase in drawing power?
- c) What is the optimum form (in terms of logistics and drawing power) of nutritional inputs for such a program?
  - 1. on-site feeding (with or without "ready-to-eat" foods?)
  - 2. distribution of weaning food for home preparation (packaged or not?)
  - 3. distribution of vitamin and mineral tablets?

2) An in-depth study to identify environmental factors affecting pre-school child nutritional status.

This study involves a careful examination of existing data and the gathering of new data regarding:

- a) the food production and delivery system in rural and urban areas;
- b) the food education and attitude system in rural areas; and
- c) governmental incentives and disincentives as they affect the above.

The aim is to identify elements in the system affecting pre-school children which may be susceptible to modification in order to achieve significant changes in their diets.

As part of the above, it is proposed to specifically investigate means of improving the quality of food consumption in this group by affecting prices. Numerous parameters might be examined toward this end. Among them:

- a) food losses (both field losses and those incurred in storage, processing and distribution). Special attention might be given to the perishability of lower cost vegetables and its effect on their price;
- b) price policy particularly with respect to relative wholesale food price;
- c) seasonality of production and distribution;
- d) food marketing and profit margins in distribution;
- e) agricultural and retail credit; and
- f) transportation.

The Mission is currently studying a proposal to carry out such a study in a single Indian state ("Survey of the Nutrition System Operating in an Indian State - Sidney Cantor and Associates"). If considered feasible and if concurred in by the GOI, the Mission will seek to begin the study in FY 1970.

COUNTRY FIELD SUBMISSION

FY 1971

INDIA

ANNEX P

EMPLOYMENT & INCOME DISTRIBUTION

ANNEX PEMPLOYMENT & INCOME DISTRIBUTION

Concern has been growing within this Mission that we take another look at the fundamental assumptions on which AID's policy towards India is based. The primary goal of U.S. policy here has been the promotion of orderly political and social development within a democratic framework. Given India's extreme poverty, low rate of per capita growth, relatively sophisticated administrative and well-entrenched democratic political institutions, A.I.D. has believed, up to now at least, that the principal method of achieving this goal should be more rapid economic development. Such general development would enlarge the total size of the pie, taking much of the sting out of distributional questions. While there would be more profits for the wealthy, there would be more employment for the poor. While aspirations might be raised, hopes for a better future would also be generated. And perhaps most importantly, people would find opportunities to satisfy their desires for a better life through constructive economic behavior without resorting to extremist political activities.

It is true that at times special programs focused more specifically on problems of social development have been undertaken. Many of the programs in the field of labor and education are meant to have this effect. It is also true that many of the Mission's endeavors at persuasion have been devoted to these problems. The A.I.D.-sponsored Kanpur Seminar and resulting book on regional development is a case in point. The fact that the Mission has a special Division for Area and Regional Development also points in this direction. But the central thrust of the Mission's efforts has been to promote political stability and development through more rapid economic growth.

A.I.D.'s programs in the field of agriculture provide good examples. In recent years at least half of A.I.D.'s funds and far more than half of its T. C. manpower in India have been devoted to increasing the supply of food. Significantly, the bulk of this effort has involved the provision of inputs and the development of production and research facilities to generate them on a continuing basis. Some assistance has been given to institutions concerned with the distribution of these inputs, in particular the cooperatives, but few if any programs have focused specifically on solving the problems of small farmers, tenants and landless laborers. Indeed, the Agency has actively supported the

Government of India's Intensive Agricultural District Program, a program designed to provide a disproportionately large share of the new inputs to those farmers most able and willing to utilize them, which in India means providing more to the haves.

There have been -- and may still be -- compelling reasons for this policy. On the one hand, the supply of food, especially to the cities, has been a far more important problem than the lack of distributive justice in the countryside; and the provision of scarce inputs to those who have already proved their ability to utilize them efficiently is obviously the quickest way to increase production. Sizeable disparities in income and wealth are traditional and institutionalized in India and have not so far led to an intolerable level of social tension. If these disparities can be tolerated somewhat longer, the growth process itself will tend to ameliorate them. Incomes generated in the countryside will mean more effective demand for all kinds of goods. More food, the principal wage good, will mean that labor will become cheaper relative to capital and other inputs. And both factors together will lead to an increase in the demand for labor throughout the economy. This is the mechanism through which the problem of surplus labor was solved in the advanced countries; and there is no reason to believe it will not eventually happen in India.

On the other hand, there has appeared to be little that A.I.D. can do about problems of land tenure, distributive justice, unemployment, and similar causes of social tension, other than to promote general economic development. First, the type of investments that could conceivably ameliorate these problems -- investments that are specific to certain sectors and regions, many of which require little foreign exchange -- are not easily financed by A.I.D. The demise of the project loan as a principal instrument of foreign assistance in India and the overhang of U.S. rupees (the expenditure of which provides the Indians with no additional resources and the presence of which inhibits A.I.D. from converting dollars to finance rupee expenditures), together make it very difficult for the U.S. to influence the direction of investment. Second, many of the keys to these problems are buried in the jungle of state politics and local pressure groups, far removed from the rarified level on which A.I.D., as a foreign agency, perforce traditionally moves. To work on a different level in any significant way would require different talents, different contacts and a different style of operation, all of which would raise serious questions about our ability and the GOI's willingness to permit us to do so.

This, at least, has been the theory up to the present. But the expected success of the new technology in agriculture, plus recent signs

of political instability in the countryside, have made us begin to take a new look at the situation. What this theory tends to ignore is the fact that too rapid a rate of growth may cause as much, or more, social tension as too slow a rate. While there can be little doubt that the long-run effects of the new technology will be beneficial; particularly if the government takes advantage of the opportunities that the availability of additional resources offer, the transitional problems could be very serious indeed. At least temporarily, income distribution will worsen, as those with better access to the needed inputs and more ability to take risks apply the new technology first. Traditional wage and tenancy relationships will begin to break down as commercialized agriculture spreads. Interclass and intercaste frictions will become exacerbated as more individuals change locations and occupations. And as the underprivileged classes learn about the technological opportunities to improve their lot they will, perhaps for the first time, become restive under the traditional institutional structure that inhibits their participation in these changes.

Further, it may be useful to take a fresh look at the policy choices open to A.I.D. The prohibition on converting dollars for rupee projects is not immutable. If this prohibition were set aside, a whole range of potentially useful and exciting projects can be considered: irrigation facilities for small farmers, the development of market towns as counter-magnets for urban migration, rural and urban works programs, comprehensive area development projects. These are all ideas that the Mission has considered but been unable to bring to fruition, primarily, we believe, because of lack of resources.

While we have begun to take a new look at this situation we are far from ready to propose any change in current policy. There are too many unknowns. How is the new technology going to affect the supply and demand for labor in the countryside? What factors determine labor migration patterns? What are the likely changes in expenditure patterns as a consequence of the additional incomes flowing into the countryside? Which groups and regions are likely to benefit and which to be hurt by the social economic changes occurring? Until questions such as these can be answered at least in a general way, there is no sense in considering difficult and significant changes in policy.

Accordingly, starting about one year ago, the Mission began to develop studies that could shed some light on this category of questions. The first major product is this year's agricultural annex, "The Long

Range Agricultural Adjustment Analysis," which sets the stage by presenting a picture of the broad economic changes that are likely to occur within the agricultural sector. In particular, it presents projections of supply and demand for various food products, as well as for the inputs necessary to validate the supply projections. This will be the raw material for many studies.

The second major product of this concern is the attached study, "Agricultural Modernization and Social Change: Case Studies of Five IADP Districts in India" by Francine Frankel, a research consultant to the Mission for the past six months. This study, based on personal observations and interviews, provides many useful insights into the changing rural scene at this point in time, as well as suggesting some hypotheses about the future.

In addition, the Mission has under way and planned several other studies. The "Additional Rural Incomes Study" involves a sample survey of some 5,000 rural households to determine who is receiving the additional incomes flowing into the rural areas and how these incomes are being disposed of: how much is being spent on consumption, how much is being saved, and what forms these savings are taking. In addition, information is being collected on employment, unemployment and migration of family members during this period. Hopefully this study will follow the same households over a three-year period so that a comprehensive picture of rates of change can be established. The report of the first year's survey (which will be used to determine whether to proceed with the second and third years' studies) should be available in February or March of 1970.

The "Employment and Income Distribution Study" is still in the planning stages. It will consist of a series of papers on various aspects of these problems, some to be undertaken in house, and others to be done by Indian scholars and research organizations. These will be drawn together into a comprehensive piece which focuses on policy implications and will be incorporated in next year's Country Field Submission. By that time, we should be in a far better position to provide answers to the questions posed herein.

AGRICULTURAL MODERNIZATION AND SOCIAL CHANGE:  
CASE STUDIES OF FIVE IADP DISTRICTS

Francine Frankel

September 1969

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## INTRODUCTION

During the three five year plans, India's approach to agricultural development was characterized by a commitment to two co-equal and often contradictory goals: the economic aim of achieving adequate increases in agricultural output to support rapid industrialization; and the social objective of reducing disparities of income and status in rural life.

On the one hand, the Planning Commission appreciated the economic advantages of concentrating scarce inputs of improved seeds, fertilizers, pesticides and equipment in irrigated areas of the country where they could be expected to bring maximum returns in output. Indeed, the selection of the first Community Projects in 1952 was guided by this criteria, and they were allocated only to districts with assured water from rainfall or irrigation facilities. On the other, there was serious objection to the practice of "Pick(ing) out the best and most favorable spots" 1/ for intensive development while the largest part of the rural area was economically backward. Within a year, the principle of selective and intensive development was abandoned. The Planning Commission announced a program for rapid all-India coverage under the National Extension Service and Community Development Program with special attention to backward and less favored regions.

The social goal of reducing disparities also influenced the selection of methods of agricultural development. The planners were inclined to give only secondary importance to the introduction of costly modern inputs as a means of increasing agricultural productivity. Instead, they devised agricultural development programs based on "intensive cultivation of land by hand -- and improving conditions of living in rural areas through community projects, land reforms, consolidation of holdings, etc." 2/ Indeed, the planners strategy for agricultural development rested on the capacity of the Community Development Program to mobilize more than sixty-million peasant cultivators for labor-intensive agricultural production programs, including popular participation in community works for the construction of capital projects. The crux of the approach -- the major inducement to

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1/ India, Ministry of Community Development, Jawaharlal Nehru on Community Development (Delhi 1957), 13.

2/ P. C. Mahalanobis, Talks on Planning (Bombay: Asia Publishing House, 1961), 69.

greater effort on the part of the small farmers -- was the promise of social reform held out by large-scale initiatives for institutional change. The highest priority was assigned to rapid implementation of land reforms, including security of tenure, lower rents, transfer of ownership rights to tenants and redistribution of land. Meanwhile, State-partnered village co-operatives were created to fortify small farmers with cheap credit facilities and economies of bulk purchase and sale of agricultural commodities.

Probably it was inevitable that a development strategy requiring extensive land reforms and institutional change as preconditions for success should meet with powerful opposition from landed groups; and that in a political democracy, where landed interests are heavily represented in the legislatures, this resistance should manifest itself in a go-slow approach toward agrarian reform. By the early 1960's, most legislation on tenancy reform and ceilings on land ownership had not been effectively implemented. Yet, in the absence of agrarian reform it proved impossible to mobilize mass participation in labor-intensive community projects under the Community Development Program.

Actually, as early as 1958, lagging growth rates in the agricultural sector became a serious limiting factor on the overall rate of economic advance. By the middle of the Third Plan, four years of relatively static production levels (1960-61 through 1963-64) convinced the planners that continuation of shortfalls in agriculture would jeopardize the entire program of industrial development. Of necessity, there had to be some retreat from the social goals of planning. In 1964, the planners announced "a fresh consideration of the assumptions, methods and techniques as well as the machinery of planning and plan implementation in the field of agriculture." Two major departures from previous policy were accepted as a result of this reappraisal: (1) development efforts would subsequently be concentrated in the 20 percent to 25 percent of the cultivated area where supplies of assured water created "fair prospects of achieving rapid increases in production; and (2) within these areas, there would be a "systematic effort to extend the application of science and technology" including the "adoption of better implements and more scientific methods" to raise yields. 1/

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1/ India, Planning Commission, Memorandum on the Fourth Five Year Plan (Delhi, October 1964), 26, 29.

In October, 1965, the new policy was put into practice when 114 districts (out of 325) were selected for an Intensive Agricultural Areas Program (I.A.A.P.). A model for the new approach already existed in the fifteen districts taken up under the pilot Intensive Agricultural Development Program (I.A.D.P.), beginning in 1961. Initially pioneered by the Ford Foundation, the new approach emphasized the necessity of providing the cultivator with a complete "package of practices" in order to increase yields, including credit, modern inputs, price incentives, marketing facilities and technical advice.

The economic rationale of an intensive agricultural areas program was considerably strengthened by the technical breakthrough reported from Taiwan and Mexico respectively in 1965, of the development of new varieties of paddy and wheat seeds, with yield capacities of 5,000 to 6,000 pounds per acre, almost double the maximum potential output of indigenous Indian varieties; and also by the development at Indian research stations in the late 1950's of higher yielding hybrid varieties of maize, bajra and jowar. In all cases, the availability of controlled irrigation water and the application of the package of modern inputs, especially very high doses of chemical fertilizer and pesticides were essential preconditions for realizing maximum yield potentials. By November, 1965, the Food Ministry was ready with a full-blown version of the "New Strategy": in essence it called for the implementation of a High Yielding Varieties Program in districts that had already been selected for intensive development under the I.A.D.P. and I.A.A.P. schemes, following the same extension concepts embodied in the Package Program.

In the last few years, the High Yielding Varieties Program has assumed "crucial importance" in the Planning Commission's agricultural development strategy. During the period of the Fourth Plan, 1969-74, it is proposed to bring approximately 60,000,000 acres under high-yielding varieties of wheat, rice, maize, jowar and bajra. Yet, while this area represents less than 30 percent of the total acreage under these crops, nearly three-fourths of the additional production of foodgrains targeted for the Fourth Plan is expected to come from it. 1/ The latest report of the Food Ministry's Expert Committee on Assessment and Evaluation of the Intensive Agricultural District Program approves this strategy and recommends "not merely the continued use of the IADP approach, but its extension as a spearhead of the total agricultural modernization program for the country as a whole." 2/

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1/ India, Planning Commission, Fourth Five Year Plan 1969-74: Draft (Delhi, 1969), 125.

2/ India, Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture), Expert Committee on Assessment and Evaluation, Report on the Intensive Agricultural District Program (1960-68), Volume I (New Delhi, 1969), 4.

The New Strategy already has spectacular economic gains to its credit. For example, with the rapid introduction of high-yielding wheat varieties in the Punjab, production increased by over one-third in one year alone -- from 2,493,000 tons in 1966-67 to 3,400,000 in 1967-68. Indeed, 1968-69 saw a new record established with an estimated output of 4,000,000 tons, giving substance to the slogan of a "green revolution" in wheat production.

The new paddy varieties have shown less striking results. Important technical problems remain to be fully solved: imported varieties show higher vulnerability to plant diseases than do local strains; crop duration of the non-photo-period sensitive exotic varieties are commonly too long for the main kharif season in many parts of the rice-growing south where the plants come to maturity with the onset of the northeast monsoon; and the coarse grain quality of the imported varieties compares unfavorably with the finer grained local plants. Nevertheless, with the All India Co-ordinated Rice Improvement Project conducting large-scale experiments in hybridization -- to evolve new shorter duration non-photosensitive strains having the high yield potential of imported varieties and the disease resistance and final grain quality of local plants -- many or all of these problems may be progressively solved.

Less attention has so far been paid to the social problems implicit in the IADP approach. It is, of course, clear that regional disparities in development will be accentuated. Specifically, the dry areas of the country, i. e., the one-third of the sown area receiving less than 30" of rainfall annually -- will tend to fall further behind. But this is not all. Recently, it has been recognized that despite efforts to the contrary, the IADP approach tends to increase disparities within intensive districts also, with tenants and small farmers "shar(ing) less than larger farmers in the gains from the application of the new technology," 1/ largely for lack of capital to invest in land improvement schemes. Moreover, especially in the rice-growing districts, where there is a relatively high ration of agricultural labor to the number of farms, the introduction of modern methods "adds to the labor availability for intensive cropping but increases problems of income inequality." 2/

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1/ Ibid., 12.

2/ Ibid., 31.

In a sense, the problem of Indian agricultural planning has come full-circle. Once more, there is increasing concern about ensuring all classes of agriculturists, landowners and laborers, small and large farmers, an equal share in the benefits of the new technology. Undoubtedly, part of this renewed interest springs from a growing realization that as economic polarization increases, so does the danger of mobilizing social discontent for violent confrontations in rural areas.

This study is an enquiry into the socio-economic aspects of the new strategy of agricultural development. It represents a preliminary assessment of the social impact of the IADP approach, including the High Yielding Varieties Program, on the pattern of income distribution among various classes of agriculturists; and attempts to estimate the effect of the introduction of the new techniques on the stability of traditional rural social and economic relations. Inasmuch as broad social changes associated with agricultural modernization should be more highly advanced in districts experiencing the longest period of intensive development, five of the original I.A.D.P. districts were chosen for study: Ludhiana, Punjab; West Godavary, Andhra Pradesh; Tanjore, Madras; Palghat, Kerala; and Burdwan, West Bengal.

Data presented in this study was collected in interviews with State officials having responsibility for the subjects of agriculture, rural development, irrigation, cooperation and land reforms. Interviews were also conducted at the district level with the Project Officer and the IADP staff, the Chairmen and officers of the Central Cooperative Bank and the Land Mortgage Bank, and, in Ludhiana, with economists at the Punjab Agricultural University. Written materials have been utilized when available. In the main, however, the study relies on information collected during interviews with agriculturists. The general procedure followed was to select two or three Blocks representing major agro-climatic areas in each District, and within each Block, three villages rated as good, average, and below average with respect to the adoption of modern techniques of agriculture. One officer of the IADP staff, as well as the Block Development Officer accompanied me on field trips to the selected villages. The local officer of the Planning Commission's Program Evaluation Organization also travelled with me and acted as interpreter in interviews with representatives of the major agricultural classes, small, medium and large farmers, tenants and agricultural laborers.

LUDHIANA

No State is more closely identified with the gains of the green revolution than Punjab, and within Punjab, no District is more enthusiastically advanced as a model for emulation -- by other parts of the region and the country -- than Ludhiana. There are a number of sound achievements behind this enthusiasm. On virtually all indices of agricultural modernization Ludhiana has scored spectacular progress. Even to cite the statistical record, a dull but necessary exercise in most studies, is, in the case of Ludhiana to make an eloquent statement of the agricultural transformation occurring in the District. Among the most striking changes are the following. Between the pre-package year of 1960-61 and 1968-69, the area under irrigation increased from 45 percent to 70 percent, mainly as the result of the rapid installation of tubewells. Again, between 1960-61 and 1967-68, consumption of fertilizer increased more than thirteen times, from 8 kgs. to 110 kgs. per cultivated acre. More dramatic still, in the short period between 1965-66 and 1968-69, the acreage under the new Mexican dwarf varieties expanded from a miniscule 170 acres to an overwhelming 420,000 acres, or an area accounting for ninety percent of the total acreage under wheat. Finally, and the surest measure of success, yields per acre in Ludhiana increased from an average of 16.9 maunds in 1960-61 to over 40 maunds in 1968-69 -- i.e., by over 120 percent. Moreover, during the last two years, Ludhiana has also seen a trend toward mechanization which promises even greater efficiency in the exploitation of the new technology for intensive cropping. Exact estimates of the number of tractors now in use in the District are difficult to come by, but in April, 1969, they were not less than 2,500 and possibly as many as 5,000, most representing purchases over the past two years. The major suppliers of tractors in Ludhiana, Massey-Ferguson and International Tractor, estimated that orders currently on file with all dealers total at least another 2,500. More astounding, the Pilot Project Officer of Ludhiana District reports that he has personally received over 40,000 loan applications from cultivators for the purchase of tractors. Similar increases in the demand for smaller machines, especially seed cum fertilizer drills and threshers are also reported.

The sum total of all these changes; i.e., the installation of thousands of tubewells to bring extensive new areas under irrigation; the rapid rise in the consumption of chemical fertilizers; the widespread coverage of the wheat acreage under the high-yielding varieties; and the trend toward mechanization of farm operations does indeed add up to an agricultural revolution.

The increases in yields achieved in Ludhiana must be considered a change in kind rather than degree; so must the growing trend away from labor to capital intensive methods of production signalling the beginning of a transformation of agriculture from an impoverished "way of life" to a profitable business occupation. Indeed, those who have been most closely associated with the agricultural breakthrough in Ludhiana see in it even wider implications. They are inclined to view Ludhiana as a model and guidepost not only for the Punjab and other parts of the wheat-growing region, but for the future development of the Indian agricultural economy as a whole. For many, Ludhiana has become a symbol of the power of the new technology to break through the seemingly eternal circle of India's poverty by spearheading an agricultural "take-off" that will finally provide the momentum in rural resources and demand to boost India into a period of self-generating industrial growth.

These hopes are nowhere more in evidence than at the Punjab Agricultural University (P.A.U.) in Ludhiana among the economists who have worked so hard to ensure the success of the green revolution in the Punjab. Their projections of the future development of the Indian agricultural economy -- based mainly on their experience of recent changes in districts like Ludhiana -- is actually a familiar model in the West. It is rooted in the principle of economic rationalization, and assumes that as in the United States and Canada, so in India, the model size of operational holding will gradually expand to coincide with the increase in the minimum power unit now available. With the progressive displacement of bullock power by tractors and other machines, Indian farmers will for the first time be able to enjoy the economies of scale that have made agriculture a profitable business enterprise in advanced countries. The inefficient cultivators; i. e., the small farmers who cannot afford the new technology will ultimately find the gap in returns to investment on large and small farms so great that they will sell their holdings and leave agriculture. Similarly, the tenant class will begin to disappear: specifically the owner-cum-tenant cultivator who used to rely on leased land to create an economic unit of operation will also sell his small and scattered holdings as he finds large farmers unwilling to rent land that can be cultivated directly at a higher profit.

It is striking that the agricultural economists at P.A.U. do not view the displacement of small farmers and owner-cum-tenant cultivators with alarm. On the contrary, they assume that economic reationalization will proceed in response to changing opportunity costs; i. e., that the class of inefficient cultivators -- small farmers and tenants -- will leave agriculture

because as economic men they become aware of better opportunities in the urban sector. Partly on the same assumption the P.A.U. economists also tend to reject the thesis that mechanization will lead to greater unemployment among landless laborers. First, they suggest that while machinery may displace labor from some agricultural operations, on balance, farm mechanization will probably increase employment by (1) stimulating greater intensity of cropping; and (2) enhancing the intensity of farm practices per crop; e.g., by resulting in a higher number of irrigations, ploughings and weedings. But even if the demand for labor is somewhat decreased, they argue, agricultural laborers -- like the small farmers and tenants -- will willingly move off the land because they discover better opportunities in the urban sector. In fact, these opportunities are linked, indeed they will be created, by the very agricultural revolution that drives them from the land. According to S.S. Johl, one of the more enthusiastic proponents of this model, mechanization,

would create new types of jobs such as those of drivers, mechanics and semi-skilled laborers attending to the machinery and machine operations. This will put more demand on training institutes and there will crop up workshops and spare shops, etc. Further, the mechanization of farm operations will push up the demand and production of machines, implements and allied farm inputs which can be expected to create more jobs in the industrial sector. All this will lead to a chain reaction creating more and better jobs outside of agriculture. Thus the overall impact of mechanization would be creation of more and better jobs in the economy. We have the example of Punjab State before us . . . This experience is replicable in other parts of the country, it may vary only in degree and speed. 1/

Such projections, are, of course, questions for empirical investigation. How realistic is the assumption that the experience of Ludhiana is replicable -- in other parts of the Punjab? In the wheat growing region as a whole in the rest of the country? What has been the actual impact of the new technology on income distribution and economic opportunity for the various categories of agricultural families -- large farmers, small cultivators, tenants and landless laborers? Obviously, any attempt to formulate answers to such far-ranging questions at this early stage in the modernization process must necessarily be extremely tentative. With this caveat in mind, such an attempt is made here, based on investigations in Ludhiana District, and four predominately rice growing Districts, into the basic

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1/ S.S. Johl, Problems and Prospects of Indian Agriculture, mimeo., 6-7.

technical requirements of the new technology; the agro-economic environment into which it is being introduced; and the impact of the introduction of the new techniques, so far as it can now be estimated, on the economic and social position of the major agricultural classes.

## I

Even a casual review of the background of the green revolution in Ludhiana reveals that the District presented an unusually favorable environment for the rapid increase of agricultural production once modern inputs became available. Perhaps the most fortunate natural factor was the presence of large quantities of good subsoil water that could easily be tapped through minor irrigation works; i. e. pumping sets and tubewells. Fertile land and the high water table facilitated the development of irrigation works in an indirect way; since most areas were equally capable of irrigation, popular support could be mobilized for large-scale programs of land consolidation. In Ludhiana, like other parts of the Punjab -- and unlike most other areas in the wheat belt -- the consolidation of holdings was carried out on a large scale leaving cultivators with compact and economic units for land development. Second, surveys conducted in the District during 1961-64 revealed an extremely favorable agro-economic environment for agricultural modernization.<sup>1/</sup> Fully 80 percent of cultivating households in Ludhiana District operated holdings of about ten acres or above, an astronomical figure by all-India standards, and high even for the Punjab, where the mean size of some 58 percent of all holdings is less than ten acres.<sup>2/</sup> Actually, in Ludhiana, 37 percent of all cultivators operated holdings of 20 acres or more, accounting for about 55 percent of the total cultivated area of the District. Another 43 percent had holdings between 10 acres 20 acres, taking up another 35 percent of the area. Only 20 percent of cultivating families operated holdings of less than 10 acres and they accounted for only 10 percent of the cultivated land. Moreover, although the incidence of tenancy was high -- even the official estimate being that 46 percent of all cultivators took some land on lease -- the proportion of pure tenants was believed to be only 4 percent of the total.

When the IADP was started in Ludhiana District in 1961, demonstrations showing increased yields of 40 to 65 percent per hectare with the

<sup>1/</sup> The results of the agro-economic surveys are reported in India, Expert Committee on Assessment and Evaluation, Ministry of Food and Agriculture, Community Development and Cooperation (Department of Agriculture), Intensive Agricultural District Program, Second Report (1960-65), 273.

<sup>2/</sup> K. S. Mann, An Analysis of the Expected Shifts in Cropping Pattern of the Punjab (India) Resulting from the Introduction of High-Yielding Varieties of Crops. OSU-USAID Contract Program, (Ludhiana, Punjab Agricultural University, 1967), 16.

application of the approved "package of practices" quickly convinced all categories of farmers of the superiority of modern methods. For example, during the first four years of the package program, i. e. between 1961-62 and 1964-65, the consumption of nitrogenous fertilizer increased by about eight times; and phosphatic fertilizer by over twenty times.<sup>1/</sup> This achievement was facilitated by a very liberal policy of taccavi loans to cultivators -- VLWs were authorized to issue spot loans for fertilizer of Rs. 150; and BDO's and DAO's could authorize loans up to Rs. 1,000. Cooperative societies, which covered the great majority of cultivating families by the early 1960's were another source of cash loans that could be used to purchase fertilizers and pesticides. Data collected during this period reveals that small farmers did not lag very much behind larger cultivators in their willingness to adopt modern inputs. In 1963-64, 60 percent of farmers with holdings of more than 10 acres; 60 percent of farmers with holdings between 5 and 10 acres; and 50 percent of farmers with holdings as small as 5 acres were applying fertilizers. Indeed, while small cultivators could not afford to cover as large a proportion of their holdings, those with the smallest farms actually applied higher doses of nitrogen on the area treated than cultivators in the larger holding groups.<sup>2/</sup> The major constraint on the small cultivator was not traditional conservatism, but limited resources; this is indirectly illustrated by the wide disparities in the size of average loans borrowed by cultivators from both governmental and cooperative agencies during 1963-64. Cultivators having less than 5 acres; 5 acres to 10 acres; 10 acres to 20 acres; and above 20 acres received respectively loans of Rs. 39.17; Rs. 216.57; Rs. 249.66 and Rs. 517.63.<sup>3/</sup>

Nevertheless, it seems clear that during the first years of the IADP at least some farmers among all classes of cultivators were able to take advantage of the intensive development program to increase yields per acre through the application of modern inputs, especially chemical fertilizers. At the same time, a serious disparity rapidly emerged between the large farmers with holdings of about twenty acres or more, and the majority of other cultivators.

The prospects of achieving optimum increases in yield levels with the new package of inputs, improved seeds; chemical fertilizers and pesticides, depended on the availability of an assured water supply. In Ludhiana District, where canal irrigation covered only some 17 percent of the area under crops, (water from which was itself dependent on the monsoons), the introduction of modern practices required the installation

<sup>1/</sup> Intensive Agricultural District Program, Second Report (1960-65), 267

<sup>2/</sup> Ibid., 274, 278.

<sup>3/</sup> Ibid., 282.

of minor irrigation works, especially percolation wells, pumpsets and tubewells to provide an assured source of water all year round. Large capital investments in land improvement were actually prerequisite to the efficient utilization of modern methods. The cost of installation of the smallest tubewell, one commanding an area of about twenty to twenty five acres, was about Rs. 4,000 to Rs. 6,000. Cultivators belonging to the largest size group already tended to have private tubewells; and generally, only cultivators with twenty acres or more were in a position either to finance new minor irrigation works from their own savings or to finance agricultural investment through loans. In fact, while the volume of government loans for percolation wells, pumpsets and tubewells increased by over ten times between 1960-61 and 1964-65, the Department of Agriculture itself insisted that only cultivators having twenty acres or more of owned land could be eligible for minor irrigation loans.

As a result, during the first phase of agricultural modernization in Ludhiana, i. e., prior to the introduction of the high-yielding varieties, the large farmers with holdings of twenty acres or more made the greatest gains. With assured water, and the ready availability of modern inputs, especially chemical fertilizers, it became possible for them to replace less profitable crops like wheat plus gram mixture, and gram, with wheat. Actually, the greatest increase in wheat production in Ludhiana between 1960-61 and 1965-66 came from a striking shift in the cropping pattern. During this period, the acreage under wheat increased by 70 percent -- from about 199,000 acres to 339,000 acres -- while the area under wheat plus gram mixture declined from 157,000 acres to 86,000 acres; and the area under gram from 44,000 acres to 25,000 acres.<sup>1/</sup> At the same time, yields per acre for wheat also showed an impressive improvement with the application of fertilizer, increasing from 16.9 maunds in 1960-61 to 24.2 maunds in 1965-66, i. e., by 8.6 percent per annum.<sup>2/</sup> Altogether, from both these sources, total production of wheat increased from 45.31 lakh maunds in 1960-61 to 90.60 lakh maunds in 1965-66, almost exactly double.<sup>3/</sup> The larger cultivators therefore benefitted in two ways: by bringing a substantial portion of their holdings under the better paying wheat crop; and by increasing their yields per acre through the application of chemical fertilizer. By contrast, the gains of the small farmers were limited mainly to some improvement in yields during good weather years arising from an increase in the application of fertilizers.

<sup>1/</sup> Intensive Agricultural District Program, Ludhiana (Punjab),  
Report on the Analysis of Crop Cutting Experiments, Rabi 1967-68,  
 11-13.

<sup>2/</sup> Ibid., 3.

<sup>3/</sup> Ibid., 11.

## II

The advent of the new dwarf varieties of Mexican wheat in 1966-67 marked the beginning of a second stage of agricultural development in Ludhiana District that opened unprecedented opportunities for increasing net returns to farm management. The advantages of the Mexican varieties are by now well known. Essentially their superiority over conventional strains derives from their capacity to withstand much higher doses of chemical fertilizer without lodging. While the Mexican varieties show an average response ratio of 17 to 18 pounds per acre to additional applications of nitrogen up to doses of 100 to 120 pounds, the fertilizer response ratio of conventional varieties is roughly 1:10 with yield decline occurring at applications above 40 or 50 pounds per acre. In short, with the advent of the dwarf varieties, it became possible to double output per acre from one season to the next -- over and above the yield increases that had already been achieved with local varieties after five years of intensive development.

The implications of this productivity breakthrough for the profitability of wheat cultivation is roughly illustrated by the following figures. In Ludhiana, in 1966-67, the average yield of local wheat varieties was 2,108 pounds per acre, i. e. a little less than 10 quintals. During the same year, those farmers who adopted the Mexican varieties (mainly Lerma Rojo), achieved an average yield of 4,235 pounds per acre, i. e. about 20 quintals or exactly twice the first amount.<sup>1/</sup> Given the procurement price of Rs. 76 per quintal for Mexican varieties, the innovative farmer grossed about Rs. 1520 per acre; allowing for cost of cash inputs of some Rs. 260 per acre, the net return to management was about Rs. 1260. By contrast the farmer growing local varieties, who probably sold his output at a somewhat higher price of about Rs. 80 per quintal, grossed only Rs. 800 per acre; allowing for a lower cash expenditure on purchased inputs of about Rs. 40-Rs. 100, the net income per acre was about Rs. 700 to Rs. 760.<sup>2/</sup> On the average, therefore, Ludhiana farmers who had adopted the high-yielding varieties in 1966-67 doubled their output, and in one swoop, increased their net income by over seventy percent.

Given the powerful demonstration effect of the success of the new technology, it is not surprising that the spread of the dwarf wheat was rapid. Between 1966-67 and 1967-68, the area under Mexican varieties jumped from 18,000 acres to 245,000 acres. A second spectacular increase

1/ AID/W, Outline for Country-Crop Papers: Country, India, Crop, Wheat.  
First Draft Copy, March, 1969, mimeo., 7.

2/ Ibid., 44.

occurred in 1968-69, when almost the entire wheat area was covered, approximately 420,000 acres out of 450,000 acres. <sup>1/</sup> It is this comprehensive coverage that suggests all classes of cultivators in Ludhiana District are participating equally in the green revolution.

Nevertheless, discussions with the Project staff, the agricultural economists at Punjab Agricultural University, and most important, the testimony of the cultivators themselves indicates that while most classes of cultivators have made some gains, proportionately a much greater share has continued to go to farmers with holdings of twenty to thirty acres or more. Indeed, over the last three years, economic disparities between large and small farmers have significantly increased as a result of the introduction of the high-yielding varieties.

It is not surprising that the large farmers; i. e., those with 20 acres or more, were the first to adopt the high-yielding varieties. The successful cultivation of the dwarf wheats depended even more heavily on assured supplies of water: in fact, irrigation at fixed times in the growth cycle of the plant were essential to the realization of its high-yield potential. Only cultivators with assured water; i. e. large farmers having private tubewells, could initially take up the cultivation of the Mexican varieties. In addition, the new wheats also required more sophisticated farm equipment to produce optimum yields: improved ploughs, discs and harrows for proper land levelling; seed cum fertilizer drills for shallow planting and exact spacing of seedlings; and plant protection equipment to ward off rusts and other diseases. Only the large farmers most of whom had already made capital investments in tubewells and improved equipment, were initially in a position to adopt the new high-yielding seed varieties; many were able to double (or even treble) their output and net income with very little extra capital outlay. Some large farmers made even more spectacular gains. With the release of more disease resistant Mexican varieties (PV 18, S 227 and S 308) in 1967-68, there was such a high demand for scarce supplies that many cultivators took up production of seed rather than grain, and sold their stocks at "fantastic" prices of about Rs. 150 per quintal. Most important, the large farmers used a substantial part of their additional income

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<sup>1/</sup> Intensive Agricultural District Program, Ludhiana, Punjab  
Report on the Analysis of Crop Cutting Experiments, Rabi, 1963-68.  
 Final estimates are available only through 1967-68. The estimate of 420,000 acres under the high-yielding wheat varieties for 1968-69 is an unofficial figure provided by the Pilot Project Officer, IADP, Ludhiana.

from the dwarf wheats for reinvestment in the land, and for the purchase of agricultural machinery -- tractors, threshers and seed drills. The replacement of bullock power with tractors and threshers made agriculture more efficient, permitting cultivators to double and even triple crop; and to diversify their cropping pattern in order to include more profitable commercial crops like sugar cane, cotton and orchards. Some also used their capital to establish ancillary enterprises like poultry farming, or even to start small scale industries, e. g. dealerships in spare parts for the new machinery that came flooding into the villages. Indeed, as a result of all these innovations, each of which was related to the introduction of the high-yielding varieties, farmers with very substantial holdings of fifty acres or more experienced a qualitative change in their standard of life which represents a new departure for rural India. They attained a level of prosperity in terms of consumption -- housing, and the acquisition of amenities, including refrigerators, telephones and even cars, that compares favorably with upper middle class life in urban areas, and which has never before been seen in a village setting. Indeed, with land values increasing from about Rs. 1,000 - Rs. 5,000 per acre of irrigated land five years ago to Rs. 5,000 to Rs. 10,000 and even Rs. 15,000 an acre, a Ludhiana landowner with fifty irrigated acres now owns (untaxable) landed assets worth some Rs. 2.5 lakhs to Rs. 7.5 lakhs, and must be considered a wealthy man.

### III

All this is not to say that smaller farmers, those with holdings of ten to twenty acres have not adopted the high-yielding varieties. They have, and in overwhelming numbers. But the circumstances under which the small farmers have done so -- especially those with 10 to 15 acres -- sharply limit their gains.

Probably the greatest aid to the smaller farmer in adopting the high-yielding varieties has been the relaxation of criteria for eligibility for tubewell loans both by Government agencies and Land Mortgage Banks -- largely as a political tactic to win the popular support of small farmers. Starting with the first United Front Government in Punjab in 1967, the Agriculture Department lowered its requirement for land ownership to make farmers with fifteen acres of owned land eligible for minor irrigation loans. The current United Front Government has gone further: cultivators with holdings as small as five acres have now become eligible for government loans for tubewells. The Land Mortgage Bank has followed suit: ignoring directives from the Reserve Bank to impose a higher floor of 8 to 10 acres, they are

also advancing loans for tubewells to cultivators with five acre holdings. With the appreciation of land values over the last five years, small farmers experience little difficulty in providing the necessary security for such loans. For example, the Land Mortgage Bank places the value of unirrigated land at Rs. 5,000 an acre, and advances loans at the rate of one-half the value of land offered as security; therefore, a farmer need only mortgage two acres of unirrigated land to qualify for a loan of Rs. 5,000, repayable in seven equal installments. Under an even more liberal scheme being operated by the Land Mortgage Bank (but financed by the Agricultural Refinance Corporation), small farmers are able to get larger amounts on even easier terms: Rs. 6,500 for a tubewell, repayable over nine years, with repayment of interest only during the first year. The easy credit terms have seen the business of the Land Mortgage Bank double over the last two years. In 1967-68 the Bank advanced a total of 31 lakhs in loans, of which about 20 lakhs was for tubewells. During 1968-69 total advances jumped to Rs. 60 lakhs of which Rs. 42 lakhs was for tubewells.<sup>1/</sup> According to the Chairman of the Land Mortgage Bank, the majority of these loans for minor irrigation has gone to small farmers with ten acres or less.

There is also plentiful production credit available from the cooperatives. In Ludhiana, virtually all cultivating families are members of primary agricultural credit societies. Assuming that members are not defaulters, they can get personal surety loans at the standard scale of Rs. 300 per acre of wheat, distributed mostly in kind. In fact, in 1967-68, the Punjab Government took special steps to see that adequate credit facilities were available with the cooperatives, by financing a large new subscription to the share capital of the central cooperative banks. Compared to the 7.33 lakhs of government share capital invested in Ludhiana Central Cooperative Bank in 1966-67, there was Rs. 59.33 lakhs in 1967-68. Together with modest increases in share capital from member societies, reserves and other funds, the Bank's total owned funds increased from Rs. 56.56 lakhs in 1966-67 to Rs. 128.48 in 1967-68. As an A class Bank with a borrowing capacity of 4 times owned funds from the Reserve Bank, the State Government's additional contribution to share capital actually created an extra borrowing capacity of Rs. 200 crores. In fact, the Bank's working capital did increase from Rs. 392.10 lakhs in 1966-67 to Rs. 520.05 lakhs in 1967-68. The most striking evidence of increased

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<sup>1/</sup> Figures provided by the Secretary of the Land Mortgage Bank, Ludhiana.

business activity, however, came from the sharp spurt in advances for short-term loans between Rabi 1967-68 and Rabi 1968-69 -- from Rs. 250 lakhs (Rs. 86 lakhs in cash and Rs. 164 lakhs in kind) to Rs. 451 lakhs (Rs. 103 lakhs in cash and Rs. 348 lakhs in kind). <sup>1/</sup> Discussions with officials of the Central Cooperative Bank again confirm that advances to the small farmer, particularly cultivators with 10 to 15 acres, were mainly responsible for this striking increase. It is this class of cultivator that is relying most heavily on the cooperatives for financing the costlier inputs required by the high-yielding varieties. Moreover, while every category of farmer has become somewhat more indebted over the last few years, the 10 to 15 or 20 acre farmer is falling comparatively deeper into debt. Bank officials estimate that the indebtedness of this group of farmers has increased by about 50 percent over levels of just one or two years ago. One obvious implication is that a substantial part of the profits that can be expected from the introduction of the high-yielding varieties on small farms will be siphoned off by debt repayment at least for the next few years.

Worse still, once having incurred this indebtedness, the small farmer is still at a disadvantage in maximizing returns to his investment. Foremost among his limitations, is the small size of the farm itself. At present the command area of the smallest tubewell is about 20 to 25 acres. Extension workers and the economists at P.A.U. agree that the optimum size of holding for the efficient cultivation of the high-yielding varieties, assuming a tubewell and bullock power, is about 20 to 25 acres; this floor can be reduced with efficient management to 15 acres; but not below. Necessarily, therefore, the small farmer is denied the economies to scale enjoyed by larger landowners; the returns to his investment in a tubewell will lower than on 20 to 25 acre farms.

The limitation of size is also a crucial constraint with respect to mechanization. In Ludhiana District, replacement of bullock power by tractors and other machines is considered economic only on holdings of 25 to 30 acres and above. Not only does a tractor represent a major

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<sup>1/</sup> The figures are compiled from materials supplied by the Punjab State Cooperative Bank, Chandigarh, especially, A Short Note on the Working of the Punjab State Cooperative Bank, Ltd., showing the break-up of advances made by central cooperative banks to societies during Rabi 1967-68 and 1968-69; and a separate mimeographed statement showing the comparative position of shares, owned funds and deposits of the central cooperative banks from 1965-66 through 1967-68. The Ludhiana Central Cooperative Bank, Ltd., Ludhiana also made available comparative figures from 1960-61 to 1967-68, in a mimeographed statement, "Roles and Achievements of Cooperatives in I.A.D.P., Ludhiana."

capital investment -- ranging from the black market price of the smallest Russian built tractor at about Rs. 15,000 to Rs. 24,000 or more for a large Massey-Ferguson, but annual maintenance, calculated on the basis of a thirty acre holding, amounts to some Rs. 300 a year for servicing; Rs. 600 for spare parts; and Rs. 400 for diesel or gasoline. Other machines are less costly, but still expensive for the small farmer, e.g. small threshers cost about Rs. 720; a small combination thresher-winnowing, Rs. 1600, and a seed-cum-fertilizer drill, another Rs. 275 - Rs. 300 . 1/

Nevertheless, the startling fact is that the majority of loan applications received for tractors by the Pilot Project Officer come from farmers with fifteen acres or less. The Land Mortgage Bank has recently had a similar experience. Since 1963, when it first began giving loans for tractors, and until 1967, only the larger farmers with holdings of 30 acres or more applied for such loans. Within the last two years, however, the Land Mortgage Bank reports more loan applications from 15 to 25 acre farmers than from cultivators with 30 acres or more. . Since criteria for credit-worthiness are established on the same principles as for tubewells, except that loans are advanced at one half the value of irrigated land -- placed at Rs. 8,000 an acre -- a cultivator with about six acres of irrigated land to mortgage would be eligible for a tractor loan of about Rs. 24,000.

Despite the confidence of the small farmer, however, the Land Mortgage Bank has viewed the recent trend with mounting alarm. In fact so concerned did the Bank become at the large numbers of small farmers taking loans for tractors that as of March, 1969, it was decided to limit the percentage of loans allocated for tractors to 15 percent of the total advanced. The view that mechanization is not an economic proposition for the small farmer, i.e. in this context, cultivators with less than 25 or 30 acres, is also shared by the principle suppliers of agricultural machinery in Ludhiana District. They suggest that easy credit is tempting small farmers to purchase machines without much thought for how they will repay their loans, in some cases, simply for prestige reasons -- to keep up with the Jones' (or Singhs.) In any event, there is virtually

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1/ Estimates and prices as given by the sales managers for Massey-Ferguson and International Tractor in Ludhiana.

unanimous agreement that the present demand for tractors and other machinery among this class of cultivator is completely unjustified on economic grounds; and that it will collapse within a year or two as the farmers themselves discover it to be an uneconomic proposition. Once again, the small farmer is unlikely to find the same opportunities for maximizing farm income through double and multiple cropping that have come to large cultivators with the spread of mechanization.

There are other reasons why returns to the small farmer from the introduction of the high-yielding varieties are apt to be less than on larger farms. First, considering the high costs involved, they are less likely to use optimum doses of chemical fertilizer, and to achieve the maximum yield potential of the new varieties. This is indirectly confirmed by the decrease in average yields per acre of Mexican wheats reported in 1968-69 compared to 1966-67, from 20 quintals an acre to 14 quintals. <sup>1/</sup> In the earlier year, mainly large farmers were involved; two years later, almost all cultivators had adopted the new varieties. Second, the cost of the inputs have themselves increased over the last two years, especially since the recent excise tax on diesel oil and fertilizer, so that returns to investment are now less.

In sum, once all these limitations are taken into account, the ten to fifteen acre farmer can only make marginal gains from the introduction of the high-yielding varieties for some years to come. This is confirmed by interviews with cultivators in this size-class who report only modest increases in net income after the introduction of the high-yielding varieties -- certainly not enough to make any qualitative change in their standard of life, but just sufficient to improve the general level of consumption. As one 10-acre farmer put it, the main impact of the green revolution on his family is that they are "feeling just a little better after passing through very bad days."

Actually, the ten to 15 acre farmers who have adopted the high-yielding varieties at such great cost in indebtedness are in a much more vulnerable position than they realize. The prospect that they can liquidate

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<sup>1/</sup> According to the Report on the Analysis of Crop Cutting Experiments, IADP, Ludhiana, average yields of Mexican wheat were only 3,628 pounds per acre or approximately 16 quintals in 1967-68, p. 3. During 1968-69, it is estimated that this declined further to an average of 3,280 pounds per acre or about 14 quintals.

their debts, and continue to make a modest gain from their investment, rests heavily on maintaining the current procurement price of Mexican wheat at the artificially high level of Rs. 76 per quintal. Yet, with the large spurt in wheat production over the last two years, open market prices for Mexican wheat -- without price support -- are estimated at Rs. 60 - Rs. 65 per quintal. 1/ In 1968-69, the Punjab Government did succeed in persuading the Center not to reduce the procurement price to Rs. 70 a quintal; and undoubtedly equally determined efforts will be made in 1969-70. But it is unlikely that the central government can continue indefinitely to purchase virtually the entire Mexican wheat crop at these rates when the new varieties do not find a ready market -- their brown color marking them as inferior to the amber colored desi varieties in the minds of most consumers. In fact, the central government has been able to sustain the high procurement prices for Mexican wheat until now, only because they could compensate for the high costs of domestic stocks by pooling them with low prices imported foodgrains, and issuing all grains through the fair-price shops at a price that struck an average between the two. Specifically, the economic issue price of PL 480 wheat being some Rs. 65-66 per quintal, and the economic issue price of Mexican wheat (given procurement rates of Rs. 76 per quintal) being Rs. 87-88 per quintal, the Government was able to avoid large losses on its distribution system by setting the price of all coarse grains at Rs. 78 per quintal. 2/ But once concessional imports of foodgrains are phased out after 1971, the Central Government will find it impossible to maintain the present procurement price without heavy losses. Indeed, the Food Minister has already announced that beginning in Rabi 1969-70, procurement prices of Mexican wheats will have to be lowered and issue prices stepped up.

## IV

In Ludhiana, however, it is the bottom twenty percent of cultivators, with holdings of less than ten acres, who have fared worst as a result of the green revolution. They may have been able to make some marginal

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1/ AID/W Outline for Country - Crop Papers: Country, India. Crop, Wheat. 29.

2/ Estimates of economic issue prices compared to actual issue prices of Mexican wheat and of the rough adjustments permitted by the availability of low-priced imports of PL 480 wheat are taken from an interview with the Managing Director of the Food Corporation of India, in New Delhi, August, 1969.

gains in good weather years by applying small additional doses of chemical fertilizer to Mexican wheats; but in general, they have not been able to sustain the indivisible inputs -- tubewells and agricultural machinery -- required for the efficient cultivation of the new varieties. Actually, there is some reason to believe that their position may have suffered an absolute deterioration as a result of the green revolution.

It has already been mentioned that the incidence of tenancy in Ludhiana is quite high. Official estimates are that 46 percent of all cultivators take some land on lease. The Pilot Project Officer and the economists at P.A.U. estimate that about one-fourth of the cropped area in Ludhiana is currently cultivated by tenants. While exact figures are not available to indicate the rented in component of operational holdings by different size classes in Ludhiana District, an investigation of selected sample villages in Punjab State as a whole, conducted by the P.A.U. in 1966-67, indicated that this proportion is as high as 27 percent on holdings of less than 10 acres. Significantly, it declines to 15 percent on medium size holdings of about 20 acres; and to little over two percent on large holdings of 50 acres. 1/

There is little doubt that the position of tenants has become more difficult as a result of the green revolution. With profits from direct cultivation rising, there are now more farmers who want to lease in land than lease out. Moreover, large farmers now find a positive advantage in larger units of management, with new possibilities for more efficient agriculture with mechanization. Those large farmers who still give out some land on lease usually demand a premium in higher rents. Compared to five years ago, cash rents on leased in land have increased from about Rs. 300 - Rs. 350 to Rs. 500 per acre. More commonly, sharecropping arrangements are made. In some cases, the traditional rate of a 50-50 division of gross output between the owner and the tenant is maintained; and the owner may also pay half the cost of fertilizers and diesel for irrigation. But in many instances, tenants are not so fortunate: landowners may ask for 70 percent of the crop as their share, arguing that with new methods, the tenant still receives a larger absolute portion from 30 percent of a higher output than fifty percent of a lower output. But since most small owner-cum-tenant cultivators

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1/ K.S. Mann, *An Analysis of the Expected Shifts in Cropping Pattern of the Punjab (India) Resulting from the Introduction of High-Yielding Varieties of Crops.* 16-17.

cannot afford to invest in optimum production practices, they find the new rentals uneconomic, and gradually are forced to give up as a cultivator. One solution has been to "rent" out small holdings of two to four acres to large farmers, who supply the actual owners with modern inputs for cultivation and take fifty percent of the crop as their share. Some small owners have also decided to take advantage of rising land values and sell their small holdings, either to liquidate debts, or to start a new enterprise, such as poultry farming. Pure tenants, those with no land or bullocks to sell or "rent" are in the worst position. They may be taken on as a sharecropper by a large farmer who supplies all the inputs, and pays the tenant 20 of the crop as his share.

## V

The situation of landless laborers in Ludhiana District appears much more favorable at first glance. Accounting for only 18 percent of all rural families, they have never been so numerous as to suffer from the worst extremes of rural underemployment. Even before the introduction of the high-yielding varieties, agricultural laborers could generally find some work eight months a year. Moreover, during the peak harvest period, there was always a relative shortage of labor, and many farmers have traditionally relied on migratory workers from Uttar Pradesh to supplement the local labor force. Laborers in Ludhiana District have been fortunate in other ways: many belong to the Scheduled Castes, and those who manage to pass their matriculation or get a B.A. -- still very few -- can benefit from the policy of reserved places in government services to secure employment as a peon or a Grade 3 officer. Others can follow a more traditional avenue of social mobility in Ludhiana District and join the army.

During the first stage of agricultural modernization in Ludhiana, it appears that the position of agricultural laborers improved. The growing prosperity of the larger farmers generated an increased level of economic activity that added to employment opportunities during the off-season, especially in the construction of houses and roads; and in land improvement schemes like the installation of tubewells, drains and culverts. At the same time, the existence of good roads, and a sprinkling of small industries in Ludhiana town made it possible for some agricultural workers to find alternative employment in local factories while still maintaining their home in the village.

With the large-scale introduction of the high-yielding varieties in 1967-68, the economic situation of landless laborers seemed to improve further. Compared to a few years earlier, when a laborer remained idle for three or four months a year, he now found employment all year round. This was due mainly to more intensive cropping with the large increase in irrigation facilities; more labor intensive farm practices per crop; and diversification of the cropping pattern which creates additional demand for workers during traditionally slack seasons, e.g. during December to mid-March for crushing sugarcane, and during July and August for hoeing and weeding maize. Moreover the new level of affluence of many cultivators accelerated the pace of new investment, creating additional employment in the off season for installation of tubewells; land levelling; and repair of irrigation channels; and also for construction of roads and houses.

At the same time, cash wages for casual labor increased. Rates generally doubled over the last few years from about Rs. 2.5 to Rs. 5 plus tea. In areas where local labor was particularly scarce, rates went as high as Rs. 6, and in some cases also included food. Work on construction projects during the off season also brought about Rs. 5 per day. Moreover, during the peak harvest season, when labor was scarce, reports of wages as high as Rs. 8 or Rs. 10, even Rs. 12 per day plus food were common.

Notwithstanding all this, the laborers generally do not feel that they have made any substantial net gains over the last few years. Indeed, they tend to argue that the rise in prices of essential commodities has neutralized any improvement arising from higher levels of cash income. Actually, the laborers of Ludhiana still tend to judge the real level of their wellbeing not in terms of cash earnings, which are devalued by inflation, but by the market price of the crop share that laborers have traditionally received at harvest. It is largely on the basis of this yardstick that laborers assert they have experienced very little improvement in real income over the last few years.

Despite this subjective assessment, it is still true that the introduction of the high-yielding varieties initially enhanced the economic position of agricultural laborers by increasing their bargaining position at harvest time. Large farmers engaged in multiple cropping were greatly concerned with speedy harvesting of standing crops. In addition, with larger crops to handle, more laborers were required to complete the job

within the allotted time. Finally, whereas the desi varieties could be harvested over a period of twenty days or so, the dwarf wheats tend to shatter unless they are harvested within ten or fifteen days. With such a high premium placed on timely labor, it is not surprising that agricultural workers attempted to exploit their new advantage by bargaining with landowners for increased wages, often threatening to work elsewhere if their terms were not met. Even with migratory labor also available, these techniques were partially successful.

Actually, far from believing that the laborers deserve any increase in wages, landowners are convinced that with the output of the new varieties roughly doubled, they would be justified in reducing the laborers customary crop share from  $1/20$  to  $1/40$  of the harvest. The laborers, for their part, assert that they should share in the increased output in the same proportion as the landowners, i. e. that the traditional rate of  $1/20$  should be maintained. Over the last couple of years, a compromise has been struck which has seen the customary rate reduced from  $1/20$  to  $1/30$ . Agricultural laborers now receive every thirtieth bundle they tie before putting the grain on the threshing floor. Their gains under this formula are real. To illustrate, using desi varieties, there are normally 80 bundles to one acre. Under the old system of division, 4 bundles, i. e.  $1/20$  averaging about 16 kilos each was paid for harvesting. Using the high-yielding varieties, there are now some 120 bundles in an acre: at the new rate of  $1/30$ , four bundles are still paid as wages, but each now weighs 20 kilos to 25 kilos depending on the condition of the crop. <sup>1/</sup> The net gain to the laborer, therefore, is about 25 percent in real income, compared to gains of 50 percent or 75 percent or even 100 percent realized by the landowner. Nevertheless, the increase is sufficient to permit some modest improvement in the general standard of living: e. g. to provide better food; a change of clothing; a cleaner home; cups and saucers (instead of metal glasses); and in some cases, the margin necessary to send a son to school; or to keep cows or goats for milk; and even to buy a luxury item like a transistor.

Unfortunately, these gains are likely to cost the laborers dearly in the future. Already, the landowners are resentful at what they consider the laborers blackmailing tactics. They have agreed to pay the higher wages, but have retaliated by applying other economic pressures; e. g. by denying

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<sup>1/</sup> Estimates supplied by S. S. Johl, Professor of Economics, Punjab Agricultural University, Ludhiana.

laborers traditional rights of taking fodder from the fields for their animals, or additional payments in kind of fuel and vegetables. A greater hardship for many laborers, is the landowners refusal to advance interest-free loans, which used to be done, they explain for "good-will", but which the laborers have breached by adopting bargaining tactics. More serious is the landowners determination to convert all kind payments into cash. They have already succeeded in substituting cash for the traditional payment in kind given for winnowing operations; and they clearly intend to press this pattern for harvesting operations as well.

Actually, the large farmers believe that the laborers new bargaining power is bound to be transitory. They are aware that it is only at harvest time "that the laborers are our masters, and during the rest of the year we are their masters." The large farmers are now determined to mechanize harvesting operations as quickly as possible, in order to be rid entirely of their dependence on agricultural laborers. Indeed, they are convinced that with the advent of labor-saving machines, e. g. thresher-winnowers, which not only represent large capital outlays by the cultivator but also substantially reduce the manual labor exerted during farm operations, that the traditional system of payment in kind now operates to exploit the landowner. Assuming that the pace of mechanization does increase, e. g. if combines or other mechanical harvesting devices are introduced on a large scale in Ludhiana, the laborers will have lost their major advantage and their best prospect of realizing significant gains from the green revolution.

## VI

If one reviews the experience of Ludhiana as a whole, it appears that most classes of cultivators have made some gains as a result of the green revolution. Nevertheless, the benefits have been very heavily skewed in favor of the large farmer, the cultivator with 25 to 30 acres or more, who has been able to exploit the full potentiality of the new technology for multiple cropping and diversification of the cropping pattern by large capital investments in land improvement and mechanization. Although 15 to 25 acre farmers have also experienced absolute increases in output and income, the gap between the large and medium farmers has undoubtedly widened. Small farmers, those with 10 to 15 acres have so far made only marginal gains, and ultimately they may even find their farm operations over capitalized and uneconomic. Some farmers with less than ten acres have experienced an absolute deterioration in their economic position with the increasing difficulty of finding leased in land on reasonable terms. The condition of landless laborers has improved, but at a proportionately smaller rate than that of large landowners, and even these modest gains are threatened by the rapid drive toward more complete mechanization.

Ludhiana being the best case, it is extremely doubtful that the present trend toward mechanization will have the sanguine outcome that the P.A.U. economists project; i. e. an increase in the model size of holding to coincide with the minimum power (tractor) unit, while sustaining only a minor decrease in rural employment that can be absorbed by the creation of new job opportunities outside agriculture. This, no doubt, is the western model; and for the moment, it appears to be the model for Ludhiana, but Ludhiana is a typical even for the Punjab. The average size of holdings is larger -- extending greater opportunities for modern farming to more cultivators; and there is a relatively well developed industrial sector, as well as a tradition of recruitment into the army, to help absorb displaced tenants, small farmers and agricultural workers. Where these advantages do not exist, and they do not even in some districts of the Punjab, rapid mechanization has already produced "large numbers of unemployed or under employed young men in the villages ... who may present serious socio-economic and law and order problems in the years to come." 1/ Perhaps more immediately serious, is the rapid deterioration in "good relations" between landowners and agricultural laborers with an acceleration of the erosion of traditional ties based on payments in kind. Even in Ludhiana, where agricultural laborers are considered the most prosperous in the State, the sense of injustice nurtured by this change has already led to the first confrontations between "landlord" and "laborer" factions in the villages. With a rapid increase in political awareness among the Scheduled Castes and backward classes generally, even conservative political leaders predict that if nothing is done to check the growing inequalities at the village level, economic and class issues will increasingly replace communal questions as the foremost political problem in the State. As for the leftist parties, the CPI (M) have been actively working toward this end ever since they participated in the first United Front Government of 1967, by vigorous efforts to organize agricultural laborers for strikes at harvest time.

In other parts of the wheat belt, eg. Uttar Pradesh and Bihar, where the majority of cultivating households operate holdings of less than ten acres; where iniquitous tenurial arrangements are an additional drain on the meagre resources of the small farmers; where the incidence of landless laborers is higher; and where the level of industrial development is low, it is difficult

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1/ The Statesman, May 23, 1969

to see how more than a small section of the agricultural population will be able to realize significant benefits from the wheat revolution. Indeed, the gains in these areas are likely to be even more heavily skewed; the increase in disparities larger; and the rate of displacement greater than can reasonably be expected to be absorbed through the creation of alternative job opportunities outside agriculture. Occurring as these changes are, in a social context characterized by an erosion in traditional ties, and an incipient polarization on the basis of class, it would not be surprising if efforts by political parties to mobilize social discontent for power purposes would lead to increasing instances of class confrontation in rural areas.

In the rice belt, where each of these problems is magnified several fold, and all tend to occur together, the problem of ensuring a reasonable degree of equity in the distribution of gains from the new technology are even more formidable -- as is likely to be the law and order problem, arising from a failure to do so. This emerges clearly from a consideration of agricultural modernization and social change in the predominately paddy growing districts of West Godavary, Tanjore, Palghat and Burdwan.

## WEST GODAVARY

West Godavary has been one of the more successful I.A.D.P. Districts. Yet, even here, the broad complex of problems that have limited the advance of the rice growing region as a whole are clearly evident; imperfect technology; inadequate irrigation; small holdings; iniquitous tenancy arrangements; and lack of private capital for investment. Compared to Ludhiana, where wheat yields increased by over 66 percent even before the introduction of the high-yielding varieties, in West Godavary, during the same period, yield rates of paddy did not increase by more than 24 percent. 1/

One major constraint during the initial period was the limited effectiveness of the package of practises when applied to local varieties. As late as 1964-65, yields obtained on demonstration plots compared to those on control plots were only some 17 percent to 19 percent higher. Although the offtake of nitrogenous fertilizer did increase by 2½ times and of potassic fertilizer by almost six times between 1960-61 and 1964-65, the average yield per acre quickly reached a plateau. Compared to 10.7 bags\* per acre during the base period of 1958-61, average yield rates stabilized at 13-14 bags between 1961-62 and 1967-68. 2/

Also in striking contrast to Ludhiana, coverage under high-yielding paddy varieties expanded very slowly. In West Godavary District, about 9 lakh acres are normally under paddy: 7 lakh acres during kharif; and 2 lakh acres during rabi. The first introduction of I.R. 8 came during rabi, 1966-67 when it was planted on an area of 687 acres. Subsequently, during 1967-68, I.R. 8 and Taichung Native 1 were planted on 7,540 acres and 36,276 acres during the kharif and rabi seasons respectively. In 1968-69, the targets were 20,000 acres during the kharif; and 50,000 acres for rabi. 3/ A more ambitious program is projected for 1969-70, with 30,000-40,000 acres during kharif; and 100,000 acres during rabi. Even if these targets are realized, however, only some 15 percent of the total paddy acreage will be covered.

This slow rate of adoption can be partly explained by the relatively modest increase in profit margins from the cultivation of I.R. 8 and other high-yielding varieties over returns from improved local varieties. As estimated by the Project Officer, and generally

1/ IADP, Andhra Pradesh, Agricultural Information Unit, Eluru, Souvenir, 1969, P.P.V. Krishna Murthy, "Yield Trends in West Godavary District during 1961-62 to 1967-68", 37.

2/ Ibid., 37. Also see Intensive Agricultural District Program, Second Report (1960-65), 153, 155.

3/ IADP. Eluru, District Agricultural Plan and Plan of Action 1968-69, West Godavari District, 33, 35.

\* One bag of paddy is the equivalent of 75 kgs.

confirmed in interviews with cultivators, production costs for I.R. 8 are approximately Rs. 500. Average yields tend to fluctuate between 30 to 35 bags per acre, (22 to 26 quintals). At the current procurement price of Rs 49 per quintal, gross returns vary between Rs 1078 and Rs 1235; net profits range between Rs 578 and Rs 735. By contrast, estimated production costs for local varieties are about Rs 250. Yields vary between 15 and 20 bags per acre, (11 to 15 quintals). However, the local varieties produce finer grain than I.R. 8 and command a premium price in the market of Rs 55 per quintal. Gross returns range from approximately Rs 605 to Rs 825; net profits vary between Rs 355 and Rs 575 per acre. The net gain to the cultivator of growing I.R. 8 in preference to local varieties therefore totals about Rs 160 to Rs 223. With the release of the new dwarf hybrid jaya in 1968, (a cross between the indigenous T 141 and Taichung Native 1), which outyields I.R. 8 by over 12 percent, this profit margin may be slightly increased.

Even so, a net gain of 30 percent to 60 percent per acre from the cultivation of high-yielding paddy varieties would usually be considered sufficient incentive for adoption — assuming the rate of return to additional investment was assured. In the circumstances of West Godavari, however, the opposite is the case. Risks of cultivating the new varieties are still so high that while farmers may win an extra Rs 200 or so, they are liable to lose double that amount (in production costs), if the crop fails, e.g., for lack of adequate water. Actually, an investigation into the conditions surrounding the successful adoption of the high-yielding paddy varieties in West Godavary reveals that only large farmers in irrigated areas, cultivators with ten acres or more, are in a position to overcome these obstacles by making the large capital investments in minor irrigation works needed to realize the full yield potential of the dwarf paddy varieties.

## I

The dwarf varieties of paddy, like the dwarf wheats, derive their basic superiority over conventional strains from better lodging resistance to high doses of fertilizers. Compared to recommended applications for local varieties of 15-30 pounds of nitrogen per acre; 20 to 30 pounds of phosphates; and thirty pounds of potash, dosages for the high-yielding varieties are set at 80 to 100 pounds of nitrogen per acre; 40 to 50 pounds of phosphates; and 40 pounds of potash. <sup>1/</sup> The difference this makes to productivity is summed up in the average yield rates reported in 1966-67 for local varieties and I.R. 8 in West Godavary District, of 1500 pounds per acre and 4,620 pounds per acre respectively. <sup>2/</sup>

<sup>1/</sup> IADP, West Godavari District, Resume of Work, 1967-68, 14.

<sup>2/</sup> P.F.V. Krishna Murthy, "Yield Trends in West Godavari District during 1961-62 to 1967-68", 37, 40.

However, I.R. 8 and other dwarf paddy varieties have a number of limitations that considerably raise the risk level of adoption. The short height and heavy tillering of the dwarf varieties — the very characteristics associated with high fertilizer responsiveness and increased yields — also provide a more favorable environment than tall, thinly tillering indigenous plants for planthoppers and gall midge. Moreover, during the high humidity of the monsoon season, one variety, Taichung Native 1, proved so susceptible to bacterial leaf blight that it was all but completely rejected for future planting by the farmers. Even I.R. 8 requires very elaborate — and expensive — plant protection measures, involving at least four prophylactic sprayings and two dustings during the crop cycle and constant inspection of the plants in the fields to detect the first signs of disease and apply immediate curative treatment.

The second major limitation of the high-yielding paddy varieties in West Godavary District is a growth cycle basically unsuited to the monsoon patterns of the main kharif season. Under the conventional cropping pattern, sowing, transplanting and harvesting are adapted to the onset and departure of the southwest and northeast monsoons. Cultivators take their nurseries sometime in June — with the arrival of the southwest monsoon — transplant in mid-July and harvest in December — after the retreat of the northeast monsoon that brings particularly heavy rains during September and October. Local varieties are specially adapted to the monsoon patterns in two basic ways: they are long duration strains and photo-period sensitive. This means that indigenous rice varieties only "flowered and went into their reproductive phase of growth when day length reached a certain critical number of minutes. After flowering there was a fixed time to maturity, an interval sufficient for the monsoon to retreat and the rice to ripen ready for harvest under sunny skies." <sup>1/</sup>

By contrast, the high-yielding dwarf varieties of paddy are short duration and non-photo period sensitive. When planted during the main kharif season, e.g., in mid-June, varieties like I.R. 8 will flower and come to maturity within a fixed period of about 107 to 115 days; i.e., by mid-October or during the worst period of the northeast monsoon. Harvesting must then take place under conditions of heavy rain, and unless mechanical drying equipment is immediately available, much of the crop is lost. There are still other disadvantages: very heavy rains during the southwest monsoon may submerge the seedlings and cause serious damage to the plants; also the heavy cloud cover of the monsoon season deprives the paddy plants of the strong sunlight they need for

<sup>1/</sup> AID/W, Outline for Country-Crop Papers, Country, India, Crop, Rice  
First Draft Copy, March, 1969, 112.

photosynthesis at the end of the growth cycle to achieve optimum yields.

The result is that the dry and sunny rabi season, which traditionally extends from the end of January to late April or May provides the best conditions for the cultivation of high-yielding paddy varieties. Yet, I.R. 8, like the dwarf wheats, can be cultivated successfully only on land having assured supplies of water. In West Godavary, as in Ludhiana, maximum yields are realized under conditions of controlled water management. In effect, an essential prerequisite of the efficient cultivation of the high-yielding paddy varieties during the rabi season is an assured supply of supplementary irrigation water from a filter point or tubewell. This requirement can be better appreciated after a review of the irrigation facilities currently available in West Godavary.

## II

Of the 10 lakh acres constituting the net sown area in West Godavary, only about fifty percent is classified as delta, receiving water supplies from the canal system of the Godavary river. With the onset of the southwest monsoon — usually by June 15th — the first waters are released. However, supplies are sufficient only until mid-March or the latter part of the rabi season, when water shortages become acute. Moreover, there is not sufficient water in the canals to ensure even all delta farmers of adequate water for rabi cultivation every year. Instead, a rotational system is followed under which canal irrigated areas are divided into three zones. In the first or "permanent" zone, farmers receive water for rabi cultivation every year. Altogether, this area accounts for about one lakh acres including 68,000 acres situated near Kolleru lake, which regularly overflows during the southwest monsoon, submerging the kharif crops, and causing serious loss of kharif plantings to the farmers. The remainder of the permanent zone represents mainly "tail-end" areas, i.e., areas at the outer limits of the irrigation canals which are supposed to receive adequate water supplies during the kharif season, but on account of pilferage, often do not. The remainder of the delta area is divided between biennial and triennial zones, receiving water for a rabi crop every second and third season respectively. Even during rotational years, however, the farmers still face water shortages by mid-March.

The situation is much worse in the uplands area of the District which accounts for little less than one-half the net sown area, or just under five lakh acres. Approximately one lakh acres is served by tanks, but water supplies are directly dependent on rainfall. As a result, most uplands farmers lose at least some part of the first kharif planting because of water shortages during the latter part of the season; and usually, they take only groundnut or gingelly as a second crop.

Given the limitations of water supply, the second paddy crop has not only been limited in area — to about two lakh acres annually — but also in yields on account of water shortages beginning in mid-March. One innovation early sponsored by the I.A.D.P. was a plan to advance the planting of the second crop by one month in order to make more efficient utilization of available water supplies. Under the traditional cropping pattern, water in the canals was not utilized (except for perennial crops like sugarcane and banana) between the first week of December when the kharif crop was normally harvested, and the middle of February when the rabi crop was planted. If nurseries could be raised during the second week of December — instead of mid-January — and seedlings transplanted during the second week of January — instead of mid-February — the shorter duration varieties raised in the rabi season would come to harvest by the last week of March or early April, avoiding the worst effects of prolonged water shortages in the latter part of the season. Initially, this scheme was unsuccessful. The low temperatures during December affected the growth of seedlings in the nursery; and the seedlings also suffered from severe attacks of stem-borer in the nursery and in the field which resulted in total or partial failure of the crop. By 1964-65, however, the Department of Agriculture and Agricultural Research Stations succeeded in perfecting a package of fertilizer and plant protection practises that was effective against both these problems. By rabi 1967-68, an area of about one lakh acres was planted with an early second crop; and in 1968-69, the target was 1.5 lakh acres. 1/

Nevertheless, this innovation did not significantly help in extending the area under the high-yielding paddy varieties during the rabi season. I.R. 8, while a "short-duration" kharif variety when compared to local strains, was actually 20-25 days longer than the local varieties used during the rabi season. Even when planted as an early second crop, it could not be harvested until late April, i.e., well after the period of water scarcity set in. Possibly, with the release of Padma in 1968, (a hybrid produced by crossing an indigenous variety with Taichung Native 1) this limitation will become less serious. Compared to I.R. 8 which requires 107-115 days to flower, Padma needs only some 81 days. But as a fine grained variety, the average yields of Padma are less than I.R. 8, usually not more than 3,700 pounds. 2/ In any case, the need for controlled water management and timely operations will still place a premium on the availability of supplementary water from minor irrigation works.

1/ The difficulties and achievements of raising an early second crop are outlined in District and Agricultural Plan and Plan of Action, 1968-69, West Godavari District, 56-57.

2/ The comparative advantages of Padma and I.R. 8 are analyzed in S.V.S. Shastry, "New High-Yielding Varieties of Rice: Jaya and Padma" Indian Farming, February, 1969.

## III

Actually, a number of benefits would flow to cultivators from the rapid expansion of minor irrigation in the delta. First, while the Southwest Monsoon rarely fails completely, it is often delayed. Cultivators are supposed to receive the first water from the canals by June 1st; they are fortunate if it comes by June 15. Those with holdings at the bottom of the supply channel may have to wait an additional month for their first water. Such delays may prolong the period of the first crop well into December, and reduce the cultivator's opportunity of taking an early second crop to avoid the serious water shortages beginning in March. By contrast, with a filter point or tubewell, the farmer does not have to wait for the release of the canal waters to begin cultivation of the kharif crop. He can take an early nursery in May; transplant by mid-June, and harvest by mid-November, gaining ample time for an early rabi crop of high-yielding paddy varieties. Second, while the average rainfall in West Godavary is high—about 40" to 45" annually—it is also erratic. In some years, water shortages develop earlier and are more acute. Again, with a filter point or tubewell, the farmer can be certain of supplementing canal irrigation at the end of the crop season to avoid any loss in yields from water shortages. Finally, there is the advantage of being able to double crop paddy land every year, even if the holding is located in a biennial or triennial rotation zone. Actually, the IADP staff is convinced that triple cropping would also be feasible with short duration varieties "under assured irrigation facilities, if provided from early in the month of May until the end of April."<sup>1/</sup>

There are other ways in which the expansion of minor irrigation works could transform the agricultural economy of the district. At present the uplands area hardly has any assured supplies of water. Cultivators mainly grow millets (gram, bajra and jowar) and put a small part of their holding under paddy only to lose at least part of the crop because of water shortages late in the season. Frequently, there are drought conditions year after year. In one uplands village, Pangdigudem, drought for three consecutive years had dried up virtually all minor irrigation tanks and wells. Out of a net sown area of 1544 acres, 1027 acres had to be left fallow; and of the 455 acres normally under paddy, perhaps fifteen or twenty acres had been planted. The losses to the cultivators were staggering: they were subsisting only on some small returns from groundnut plantings; occasional work as agricultural laborers; loans from the local mahajan; and by misutilization of loans for land development taken from the local Land Mortgage Bank. By contrast, with borewells, these same cultivators

<sup>1/</sup> District Agricultural Plan and Plan of Action 1968-69, West Godavari District, 66.

would be assured of one paddy crop; and an additional light irrigated cash crop during the rabi season. Not only would they be guaranteed a relatively stable standard of living from year to year, but according to estimates of local extension staff, they could double or even treble their average annual net income.

If the rapid installation of minor irrigation works would be desirable, estimates of underground water resources in West Godavary suggest that a large expansion program would also be feasible. Indeed, some preliminary ground water surveys have indicated that "all uplands areas of (West Godavary) District are particularly well endowed with vast underground water resources.<sup>1/</sup> The situation in the delta areas is less certain. But apart from some stretches where the subsoil water is known to be saline, it appears that there is also substantial scope for the development of supplementary irrigation works.

Yet, whatever the future benefits, the installation of a filter point or tubewell by a cultivator requires an immediate capital investment of very substantial proportions. In the delta areas where the water table is relatively high, the cost of installation for a filter point may vary between Rs. 500 to Rs. 2,000; adding another Rs 2,500 for an electric motor or Rs 3,500 to Rs 4,000 for an oil engine, the total cost of a filter point can range anywhere between Rs 3,000 to Rs 6,000. In the uplands area, where underground water is often much deeper, and power drills are required to sink borewells and tubewells, the total cost of installation may range as high as Rs 2,500 to Rs 7,500. Adding the expense of an electric motor or oil engine, the total cost may come to Rs 5,000 reaching as high as Rs 10,000 or Rs 11,000.

There are two major sources of finance for such investments: personal savings or loans. In the prosperous delta areas where conditions are suitable, i.e., where the subsoil water is not saline, farmers with ten acres or more are often able to finance filter points and pumpsets from their own resources. In the relatively backward uplands area, greater reliance is placed on loans from the Land Mortgage Bank.

The Ellore Cooperative Land Mortgage Bank serving the uplands area has recently taken a liberal view in establishing criteria for land development loans. It has introduced a new scheme under which landowners may receive loans for borewells at 50 per cent of the potential value of the mortgaged land; i.e., the value it would acquire after being irrigated. Arriving at a valuation of Rs 3,000 per acre of irrigated land (By analyzing the sales statistics in the

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<sup>1/</sup> Agricultural Information Unit, Eluru, Souvenir, T.V. Ratnakar Rao, "Prospects of Underground Water Exploitation in West Godavary District", 6.

Registrars office over the last seven years, and averaging the prices for land transactions), a cultivator may receive Rs 1,500 per acre of mortgaged land toward the price of a borewell. Under this policy, there has been a steady increase in the number of loans sanctioned for borewells from 124 in 1965-66 to 159 in 1966-67 to 287 in 1967-68 and 362 during the first nine months of 1968-69. During 1965-66 and 1967-68, the number of loans sanctioned for oil engines and electric motors has also increased from 16 to 40 to 80 respectively. 1/ Yet, with the total cost of borewells and pump-sets in the uplands area at a minimum of Rs 5,000, and often closer to Rs 10,000, a cultivator must still be in a position to mortgage about four to seven acres of land in order to be eligible for a loan. In fact, the officials of the Land Mortgage Bank estimate that about 60 percent of loans for borewells have gone to agriculturists with 10-15 acres or more; and the bulk of the remainder to farmers with five to ten acres. Altogether, the area irrigated through bores and tubewells is now estimated at about 65,800 acres. 2/

In both the delta and uplands areas, however, the large majority of cultivators, i.e., farmers with less than five acres, have not been able to afford the large capital investment for minor irrigation works. As a result, they have been excluded from the green revolution not only as narrowly defined, i.e., as the adoption of high-yielding varieties - but from the gains in output and income that become possible with assured irrigation water through more efficient utilization of modern inputs; the introduction of intensive cropping; and the diversification of the cropping pattern to include more profitable commercial crops.

#### IV

This state of affairs is not surprising once attention is focused on the agro-economic pattern of West Godavary District. While potentialities of underground water exploitation may not be much less favorable than in Ludhiana, the small size of the average holding, and an iniquitous tenurial system, prevent the majority of farmers from accumulating any surplus capital for investment in land development.

According to an agro-economic survey conducted in West Godavary District between 1961-64, only the top 15 percent of all cultivators operated holdings of ten acres or more. Fully fifty percent culti-

1/ Data supplied by Secretary of the Ellore Cooperative Land Mortgage Bank, Ltd.

2/ T.V. Ratnakar Rao, "Prospects of Underground Water Exploitation in West Godavary District", 6.

vated land less than 2.5 acres; another 21 percent had holdings between 2.5 acres and five acres. The remaining fourteen percent operated farms between five and ten acres. 1/ Using the rough rule of thumb applied by the Ellore Cooperative Land Mortgage Bank, i.e., that three acres is an economic unit in the irrigated delta area; and 10 to 15 acres in the dry uplands area, it appears that the majority of cultivators were operating uneconomic holdings at the time the I.A.D.P. was introduced in West Godavary District in 1961.

Actually, the situation was even worse than the data on holding size suggests. Although the official survey estimated that 14 percent of all farmers cultivated some land on lease, accounting for only 10 percent of the total area, this figure was certainly too low. A field investigation by Wolf Ladejinsky in 1965 concluded that one-half of all cultivators took some land on (oral) lease, and actually operated about 50 percent of the total area. 2/ In the villages visited during April, 1969, upwards of 30 percent of all cultivators were reported to be taking some land on lease, and estimates of the area operated by tenants ranged from 50 percent (two villages), 30 percent (two villages) and 20 percent (one village). Moreover, the rates of rental, while variable, were always so high as to prevent the cultivator from accumulating any surplus for investment in improved practises.

The most common tenancy arrangement in the delta area is the fixed share system. Under this scheme, rentals are set at a fixed number of bags of paddy per acre, regardless of actual output. Over the last five years this rate has been increasing by about one bag annually to about 11 bags per acre in 1968-69. Since the landowner receives the same payment regardless of output, he has no incentive to advance production loans to tenants. Some landlords, it is true, do advance interest-free loans as a matter of "goodwill", but many, especially "absentees", who may live in another village, do not. Since the overwhelming majority of tenants cultivate on oral lease and are not generally members of the cooperatives, (or, if members, eligible for very small personal surety loans only), they must rely mainly on private moneylenders for production credit. In most cases, therefore, they apply little or no fertilizer and no pesticides on leased lands, and yield levels during the kharif season have tended to remain relatively constant. Assuming average yields in the most fertile areas of the delta at 15 bags to 18 bags per acre, rentals account for about 60 percent to 70 percent of the total kharif crop.

1/ Intensive Agricultural District Program, Second Report (1960-65), 162.

2/ Wolf Ladejinsky, A Study of Tenurial Conditions in Package Districts (New Delhi: The Planning Commission, 1965).

It is clear that the fixed share system leaves tenants such a bare margin over costs that they cannot possibly sustain increased expenditure on improved practises on leasee in land. For example, a representative case of costs and returns under this system is the following. A cultivator pays 11 bags paddy in rent for every acre of paddy land leased in. His yields with local varieties are 17 bags; after paying rent, the tenant is left with 6 bags. With costs of production accounting for another 4 bags, his net income is two bags. In cash terms, each bag of paddy being valued at about Rs 35, net income from one acre of leased in land is Rs 70.

If there is a second rabi crop of paddy, the more typical share-cropping arrangement is an equal division of 50:50 between the landlord and the tenant, with the more progressive landlords sharing the costs of fertilizer and pesticides. Even so, tenants will not normally risk cultivating I.R. 8 during rotation years: they fear the high expenditure involved and possible damage to the crop from inadequate water or pest attack. Assuming biennial rotation, the tenant will grow a second paddy crop of local varieties every other year, and share the output with the owner on a 50:50 basis, increasing his return marginally to about 2.5 or 3 bags an acre.

Even so, tenants who cultivate under the fixed share system are in a better economic position than those who rent land on a proportional cropshare basis. With the value of irrigated land in the most fertile delta areas skyrocketing over recent years, e.g., in some villages one acre of irrigated paddy land has increased in value from Rs 2,000 10 years ago to Rs 20,000 in 1968-69, many landlords are insisting on sharecropping arrangements based on a 70:30 division in favor of the landowner. In some instances, landlords share the cost of fertilizers and pesticides in proportion to their crop share; however, during the kharif season, tenants generally apply very little fertilizers or pesticides either because they believe it will be washed away by heavy rains; or that local varieties will do almost as well without fertilizer; or that fertilizers damage the soil over a long growing season. If there is a second rabi crop, sharing will generally still be done on a 50:50 basis, with the landlord absorbing half the expenditure on fertilizers and pesticides. However, where I.R. 8 has been adopted as a rabi crop, landlords may demand 70:30 or even 75:25 crop share, although in the latter case, they pay the full cost of fertilizers and pesticides to ensure maximum yields.

Of the four tenants interviewed taking land under this arrangement, all reported net losses on their investment. While this is by no means an adequate sample, it is at least suggestive. To cite one case: the tenant paid seventy per cent of the output as rent on every acre of irrigated paddy land leased in. His yields were ten bags per acre during the kharif season. With each bag valued at Rs 35, the gross value of his output was Rs 350. 70 per cent, i.e., 7 bags or Rs 245 was paid to the landlord as rent, leaving the tenant with 3 bags or Rs 105. Taking account

of his production costs of about Rs 200, the tenant sustained a net loss of Rs 95 per acre. Because of the high expenditure and risk involved, tenants will usually not adopt I.R. 8 during rotational years. Nevertheless, one tenant-cultivator did try I.R. 8 on leased in land, the landowner sharing costs for fertilizers and pesticides in the same proportion as his crop share, i.e., 70:30. Again, the tenant experienced a net loss. Estimating his own costs at about Rs 233 per acre, and yields from I.R. 8 — in the absence of assured water supply — at about 15 bags per acre, his gross returns at Rs 35 per bag were Rs 525. Of this, 10.5 bags or Rs 367 went to the landowner as rent. The tenant remained with 4.5 bags or Rs 157. Compared to production costs of Rs 233 he suffered a net loss per acre of Rs. 76.

Fortunately, most cultivators taking land on lease also have small ownership holdings of one, two or three acres. Generally, they tend to apply higher doses of fertilizers on their owned land — although still far less than optimum doses — and over the last ten years this has given them some gains in yields of perhaps 5 percent a year. But the only improvements mentioned by this class of owner-cum-tenant cultivator were extremely marginal, amounting to no more than higher consumption of vegetables; or a change of clothing; and in rare cases, the ability to send a son through trade school of secondary school.

Actually, under these circumstances, the small farmer with five acres or less who does not try to extent his holding size with leased in land may come out in a better economic position than the two or three acre owner who takes an additional three or four acres on lease, and then finds he has to make up losses on leased in land by profits from owned land. Yet, it is clear that the small owner-cultivator is also unable to accumulate any surplus capital for investment in land improvement, especially minor irrigation; usually, he would not even own enough land **to be eligible for a Land Mortgage Bank loan.** At most, small farmers have managed marginal increases in yields per acre, largely from the use of fertilizer, sufficient only to stabilize their present standard of living in the face of rising costs.

Small farmers in the uplands have fared worst. In a normal weather year, they may get as much as 20 bags of paddy using improved practises; allowing for an expenditure of about 5 bags (Rs 175) they may not as much as 15 bags or Rs 525 per acre. But in drought years, they lose practically the entire crop. As a result, any improvement in their condition over the last five years has been extremely limited: perhaps substitution of rice for gruel in good years as the main diet; and finer varieties of cotton shirts and dhotis.

In the delta areas, farmers have experienced small, but reliable increases in the yields of kharif paddy crops from the application of fertilizer, totalling about one to three bags per acre over the past six or seven years. Rising cultivation costs have absorbed much of the increase; generally, they report no improvement in real income. During rotation years, small farmers avoid using the high-yielding varieties. They are afraid of the high expenditure, and of damage to the crops from inadequate water or pest attack that would leave them with losses they could not withstand.

The fear of crop failures, and the consequences of defaulting on loans from the local cooperatives plays a large part in the reluctance of small farmers to take large production loans for the cultivation of the high-yielding varieties. About 75 percent of all agricultural families are now members of primary agricultural credit societies served by the three Central Cooperative Banks in West Godavary District. Nevertheless, many small farmers prefer to deal with local moneylenders who charge 24 percent to 36 percent interest per annum, but are flexible about security for loans and schedules of repayment.

In theory, tenant-cultivators and small farmers can now borrow up to Rs 1500 on personal surety loans; i.e., on the personal guarantee of two landowners, subject only to the requirement of maintaining a 10:1 ratio between loans received and share capital owned. In practise, however, tenants and small farmers are considered poor loan risks, and personal surety loans, when they are sanctioned tend to be much lower than the maximum permitted. In most cases, the amount of the loan advanced is determined according to the value of the security, i.e., land, offered by the member. For this reason, the crop loan system introduced in kharif in 1966 has never worked properly. Although loans are supposed to be advanced according to scales of finance based on the production costs per acre of paddy — set at Rs 350 per acre in kharif 1968 — small cultivators often have to mortgage part of their land to get the full amount.

Moreover, the attempt to divide production loans into three cash and kind components: (A) Rs 200 cash; (B) Rs 100 in fertilizer; and (C) Rs 50 cash, never was successful. Members refused to lift the fertilizer component of the loan, partly because of the red tape involved, partly because they were obliged to take only the variety available at the cooperative, but also because private dealers were willing to advance fertilizers on delayed repayment terms, compared to the cooperatives' insistence on a fixed schedule of repayment. The response of the cultivators was so poor, that starting kharif 1969-70, the entire loan amount will become available to cultivators in cash.

Even so, the Eluru Central Cooperative Bank anticipates that it will be difficult to meet its lending targets. Compared to a target of Rs 2 crores in short-term loans for kharif 1967-68, the Bank advanced about Rs 1.3 crores; in 1968-69, the target was raised to Rs 3.5 crores with achievement estimated at Rs 3 crores. Bank officials expect that advances will stabilize at about this level, with perhaps some small increase to 3.5 crores. 1/

This is not due to want of funds. In fact, compared to the present borrowing power of the Bank (at twelve times share capital and reserves) of Rs 7-8 crores annually, it currently borrows about Rs 3 crores, including deposits and advances from the Reserve Bank. The main reason adduced by Bank officials is "lack of demand" for loans. Actually the situation basically reflects two factors: an Individual Maximum Credit Limit for short-term loans of Rs 10,000 in the delta; and Rs 6,000 in the uplands, prohibiting larger advances to big farmers; and more important, the inability of small farmers to absorb larger loans as long as they do not have assured sources of water. If, having incurred large debts for the application of improved practises, especially for the cultivation of I.R. 8 during the rabi season, inadequate water and/or pest attack damages the crop, small farmers will be left without means of repayment — and fear that they will ultimately lose their land.

By contrast, there is striking evidence of the willingness and ability of small farmers to make full use of cooperative credit for adopting the high-yielding varieties once they are assured of adequate irrigation facilities. In one delta village of Achanta, groups of neighboring farmers, each with five acres of land or less, managed to pool their resources in proportion to the land each owned, and met the capital expenditure and operation costs of a filter point and electric motor. The advantages of an assured water supply as explained by one five acre partner were dramatic. Prior to joining this group in 1964, his net income from five acres of paddy was about Rs 2,000 during the kharif season. Two years out of three, he netted another Rs 500 during the rabi season from the cultivation of gingelly and groundnut, bringing his total income to Rs 2,500. During the third rotation year, he gained roughly another Rs 2,000 from a second paddy crop of local varieties, raising his annual income to Rs 4,000. After acquiring the additional facility of a filter point, this cultivator put three of his five acres under high-yielding varieties during the kharif season — realizing gross returns as a result of rising yields and higher prices for paddy — of Rs 4,200. In addition, he was able to take a second crop of I.R. 8 every year, grossing another Rs 5,400 for a total cash income of Rs 9,600. Under the new circumstances created by access to assured water, the high level of indebtedness readily incurred by this cultivator to finance production costs turned out to be very sound economics.

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1/ Data provided by the Secretary of the Cooperative Central Bank, Ltd., Eluru.

Taking into account his loans, both repayment to the cooperative of Rs 1,080 (including 8 percent interest), and to a private lender of Rs 944 (including 18 percent interest), his total debt repayment for the year amounted to Rs 2,024. Against a gross income of Rs 9,600, he was left with net earnings of Rs 7,576. Altogether, this five acre farmer had managed to increase his net income over previous levels in rotational years by almost 100 percent and in non-rotational years by 200 percent. Improvements were apparent in all aspects of his life. He had made further investments in land, buying an additional acre in a neighboring village (which he gave on lease), and on land levelling of his own holding. He also reported a change for the better in virtually all items of consumption — food, clothing, housing and furniture.

Unfortunately, such cases represent the exception rather than the rule in West Godavary. It is more common to hear reports of two, three and four acre farmers selling their holdings to take advantage of the sharp rise in land values: some to clear off old debts; others to buy larger farms in areas where land prices are lower, especially on sites that may ultimately be irrigated under the Tungabadra or Nagarajunasagar Projects. Although there is no readily available data to document these transactions, it is generally believed that outsiders, including businessmen, and richer farmers, usually those with contiguous holdings are buying the land for direct cultivation. This points to yet another difficulty that is slowly emerging to handicap small farmers: in areas where I.R. 8 has proved successful, large cultivators are becoming more reluctant to lease out land. The innovation mentioned earlier, i.e., of leasing out rabi land on a 75:25 crop share basis, with the landowner providing all modern inputs, is really a step in the direction of reducing tenant-cultivators to permanent laborers. In fact, it is clearly explained by landowners as a means of ensuring the day to day field supervision necessary for the successful cultivation of the high-yielding varieties.

## VI

The first tangible signs of increasing prosperity in West Godavary District occur only among medium holders with farms of five to ten acres, who have managed to increase yields by 25 percent to 30 percent with improved practises, and have also benefitted from the rise in prices for foodgrains. Even among this group, however, gains have usually been sufficient only to provide for higher levels of consumption, leaving little surplus for investment in land improvement.

Actually, it is still unusual in the delta areas for cultivators with holdings below ten acres to have a filter point — possibly because the smallest command area of a filter point is about this size. Although there is no way to estimate the total number of filter points installed by large farmers over the last few years, it is not uncommon to hear that in villages with good subsoil water, 100 or more filter points have been sunk in the last two or three years alone; and there is general agreement that every year the number installed is increasing.

Access to assured irrigation has brought the large farmer a new level of prosperity. Water not only assures a second crop every year, but also higher yields from rabi plantings, especially with the adoption of I.R. 8 on suitable land. Moreover, with filter points and perennial irrigation, many larger farmers are diversifying their cropping patterns to include profitable commercial crops like sugar-cane. Over the last few years alone, large farmers estimate that they have doubled their net income from all these sources. A great deal of the gain has gone into consumption: large houses; consumer durables — electric fans; radios; cycles; even refrigerators, air-conditioning and cars; and the purchase of gold ornaments. Some are also going for the education of sons. But undoubtedly, a good deal is also being invested in buying additional land, and improving land already under cultivation. As the technical problems associated with the high-yielding paddy varieties are progressively solved, this tiny class of large farmers will be in the most favorable position to maximize gains from the new technology. This point is even more forcibly made when it is remembered that in West Godavary only 15 percent of cultivators have holdings of ten acres or more, but this small minority operates fifty percent of the total cultivated area. Indeed, those with 20 acres or more are in a position to emulate their counterparts in Ludhiana by increasing their advantages even further through mechanization of farm operations. Already, many large farmers have shown an interest in acquiring tractors for more efficient utilization of the land, e.g., for more rapid puddling and threshing operations to facilitate double cropping — and also to save on labor costs. Between 1961 and 1966, the number of tractors in West Godavary District increased only from 278 to 416. <sup>1/</sup> But three years ago, loan applications with the Land Mortgage Banks more than doubled from about 28 per annum to 75; this trend has steadily increased until in 1968-69, a total of 200 applications were received — all from farmers with 20 acres or more. <sup>2/</sup> In fact, the demand is now so high that many loans cannot be sanctioned for want of available tractors.

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<sup>1/</sup> West Godavari Zilla Parishad, Eluru, Handbook of Statistics, West Godavari District, 1966-67, 88.

<sup>2/</sup> Data supplied by the Secretary of the Ellore Cooperative Land Mortgage Bank, Ltd.

## VII

With so much attention focused on the cultivator as the primary agent of agricultural modernization, it can be forgotten that in West Godavary about sixty percent of agricultural families are actually farm laborers. <sup>1/</sup> It is estimated that the majority of them, over sixty percent, work as casual laborers; and the rest are permanent workers.

Compared to very small farmers and tenant cultivators, it appears that agricultural laborers have experienced some greater, albeit extremely modest, improvements over the last few years. Permanent laborers have benefitted least. Generally, payments have not increased over the last 10 years, or only by marginal amounts of 1/2 bag or 1 bag of paddy per year. Payments to permanent laborers are variously 20 to 22 bags of paddy with no other facility; or 15 or 16 bags of paddy, and some food, clothing and shoes during the year. The cash value of these annual payments is usually little more than Rs 700 per year.

On the other hand, casual laborers reported some improvement. Opportunities for employment have increased with more intensive cultivation and the introduction of new crops. Cultivators estimate that the new rice varieties require an extra 15 to 20 man days of employment per acre during the rabi season. More important, intensive cropping and new crops have increased the work available throughout the year. In the delta areas, laborers find no difficulty in getting work for 10 1/2 to 11 months a year; even in the uplands areas laborers find assured employment for at least eight months a year as more farmers sink borewells and grow a second crop. During the off-season, laborers find employment in a variety of activities: cutting sugarcane; transporting manures; loading lorries; levelling land; deepening and desilting canals; collecting firewood; making bristles from palm fibre; and constructing houses and roads.

Rates for casual labor have also increased, generally by two times over the last six years. In the uplands, laborers can make about Rs 3 per day during the season (for transplanting and harvesting crops), compared to Rs 1.8 six years ago; and Rs 2 during the off-season. In the delta areas, laborers do a little better, earning Rs 3.5 or Rs 4 for transplanting and harvesting, compared to Rs 2 or Rs 3 five years ago, and Rs 2 or Rs 2.5 off-season. In cash terms, many casual laborers earn no more than permanent workers; but some appear to do better, earning as much as Rs 900 or more a year. Nevertheless, virtually all laborers cite only modest improvements in their standard of living because of rising costs, mainly better quality of food, e.g., two meals of rice per day instead of millets, along with some coffee or tea; the purchase of some brass vessels or stainless steel plates, or a

<sup>1/</sup> Hand Book of Statistics, West Godavari District, 1966-67, 15

charpoy and chairs. Some also report that they are now less in debt.

Perhaps the greatest and most striking gain, however, has been in social and psychological freedom. With greater opportunities for work, casual laborers can now earn as much or more than permanent laborers; i.e., the landless no longer need to seek the protection of a permanent relationship with one landowner in order to ensure their subsistence. On the contrary, they are in a position to choose their employer and bargain over terms, and along with this new independence, they have won a new measure of dignity. Casual laborers in West Godavary have long been accustomed to negotiate with landowners on wages through a team leader or mistry, (heading about ten men), but now they approach the landowners less as suppliants than as equals. Although there have been no striking economic gains, yet landowners and laborers agree that the relationship between the two sides has been psychologically transformed. During the peak period, the landowners view the laborers as "our masters"; and the laborers confirm that they now insist on shorter working hours, and breaks for lunch—as part of their "contract" with employers. Landowners complain that laborers take the same wages but work "less sincerely"; and that it now takes five men to do the work of three. But laborers clearly feel these privileges as an assertion of human dignity; many now say that they would no longer work as permanent laborers even at higher wages, because they do not want to be servants at the beck and call of the landowner at all hours of the night and day. Casual laborers stress that they are their own men. Landowners grumble at these trends, yet seem reconciled to them, and "good relations" between both sides continue. Perhaps for this reason, efforts by leftist parties to organize laborers to strike for greater economic gains have not had any marked success so far.

### VIII

West Godavary is only in the very first stages of the green revolution. Nevertheless, the overwhelming majority of cultivators have already been defined out of the modernization process by various barriers: the small size of landholding; the iniquitous tenancy system; the lack of capital for investment in land improvement. In West Godavary, any rapid acceleration of agricultural modernization will inevitably produce far wider disparities than in Ludhiana between large and small farmers -- with the major additional difference being that the first group represents a small minority of cultivators, and the second, the vast majority. Moreover, it is also doubtful that the majority of agricultural laborers will long remain satisfied only with intangible social and psychological gains. At the moment, West Godavary presents a very peaceful picture. Developments in other districts that are similarly situated suggest this may not be a lasting peace.

TANJORE, MADRAS

(Not yet completed)

## PALGHAT

The IADP program was started in Palghat District during 1962-63. Demonstrations with the recommended package of practises suggested a high potential for increasing productivity. Even with local varieties, yields on demonstration plots were 41 percent to 46 percent higher than on control plots in kharif; and about 38 percent higher in rabi. The economics of modern practises also seemed attractive: for each additional rupee expended on modern inputs, the return was Rs. 2.37 to Rs. 2.56.<sup>1/</sup>

Yet, Palghat District as a whole could not realize these potentialities. The modest increase in yields achieved between 1962-63 and 1964-65, of about 13 percent -- from an average of 1350 to 1535 pounds per acre -- was reversed by the drought year of 1965-66, when yields declined to less than 1500 pounds, and subsequently stabilized at a little above that level.<sup>2/</sup> The same unsteady performance characterized the progress in the offtake of fertilizers: between 1962-63 and 1966-67, consumption of nitrogenous fertilizers increased from 6,480 metric tons to a peak of 18,922 metric tons, and then slipped back the following year to 14,898 metric tons. During the same period, there was a slight decline in the use of superphosphate, and a modest rise in the consumption of potash.<sup>3/</sup>

As in other parts of the rice belt, the indifferent performance of Palghat District is intimately connected with the problem of water. In Palghat, the main obstacle is not inadequate supply -- the annual rainfall averages between 60" and 80" -- but inefficient utilization of available sources.

Altogether, Palghat District accounts for 2.4 lakh acres of paddy land, most of which is doubled cropped. The kharif or Viruppu crop, cultivated from May to September, covers about 250,000 acres; and then rabi or Mundakan crop, extending from September to February, about 208,000 acres. Together with a small punja or summer crop extending over some 12,000 acres, the gross cropped area under paddy is about 470,000 acres.

Yet, only about 47 percent of the net sown area under paddy -- 115,000 acres -- is served by canal irrigation from medium projects. Moreover, virtually all of the irrigation projects are located in one

<sup>1/</sup> Intensive Agricultural District Program, Second Report (1960-65), 335.

<sup>2/</sup> IADP, Palghat, Progress Report, 1961-62 to 1967-68, 10.

<sup>3/</sup> Ibid., 2

half of the District, known as the Palghat Revenue Division. The larger part of the area under paddy is cultivated under rainfed conditions in Ottappalam Revenue Division; so far, the area covered by minor irrigation projects, representing mainly lift irrigation schemes, is only some 4,000 acres.

Actually, agricultural operations in both Palghat and Ottappalam Divisions are heavily dependent on the monsoons. While the southwest monsoon rarely fails completely, the rains in the kharif season are often delayed. As a result, even in areas with canal irrigation, cultivators cannot always be certain of having adequate water at the time of transplanatation. Consequently, many do not take any nurseries for the first crop, sowing according to broadcast methods. While this practise significantly reduces the yield per acre of kharif paddy, it nevertheless protects farmers from losses they would sustain on expenditures for nurseries if water shortage at the time of transplantation caused extensive damage to yields. With the second rabi crop, the normal practise is to wait until rainfall and/or irrigation is assured to take nurseries and transplant. But in some years, the northeast monsoon arrives too late to make a second crop feasible; or, after a good start, the rains fail, causing serious losses in output. In fact, the low yield trend in Palghat District after 1964-65 is officially blamed on unfavorable weather conditions: "The unprecedented drought witnessed during the second crop of the year 1965-66 was so severe that the yield rate could not regain its original trend thereafter. In each of the successive years the climatic conditions were not at all satisfactory. Either the first crop suffered from heavy rains or the second crop withered away in the drought." <sup>1/</sup>

Yet, this is by no means an inevitable feature of the agricultural economy of Palghat. On the contrary, given such plentiful rainfall; a massive construction program of minor irrigation works -- especially tanks and open wells to store water, and pumpsets to lift it -- could transform the production of potential of the District. Cultivators could not only increase their yields from the kharif crop, substituting nurseries and transplantation for broadcast sowing, but would also be assured of full yields during the rabi crop. Indeed, many would find it possible to raise a third, short duration punja or summer paddy crop. Even more striking, Palghat does not face the obstacle of an early northeast monsoon in adopting the short-duration high-yielding varieties during the kharif season. In fact, given supplementary water facilities,

<sup>1/</sup>Ibid., 10.

it would become feasible to double crop paddy lands with I. R. 8. Actually, with the recent development of culture-28 or Annapurna, a new, short duration (90 days) high-yielding dwarf hybrid, (representing a cross between PTB-10, a local short-term strain and Taichung Native 1) it is now technically possible -- assuming supplementary water from an open well or tank -- to take three crops of high-yielding paddy varieties annually. The increase in returns to management from three crops of high-yielding varieties compared to two crops of local varieties is estimated at about 80 percent, or a difference in net profit of Rs. 3,170 and Rs. 1,750 respectively.<sup>1/</sup>

Yet, as in West Godavary, the inescapable precondition of the introduction of the new technology is supplementary water from an open well or tank. In the case of I. R. 8, it is especially necessary to be sure of having adequate water supplies since the variety must be sown in nursery first and then transplanted to achieve normal yields. Of course, cultivators can wait until water is released from the irrigation project (if there is one) or for the first rains, but there is still no assurance that the monsoon will continue in sufficient force to provide adequate water at crucial stages in the plant cycle. For example, in order to achieve maximum potential yields, I. R. 8 must have sufficient water at the time of transplantation, i. e., on the 21st day after the nursery is taken; otherwise the plant flowers early and yields are reduced. Since production costs for I. R. 8 range between Rs. 550 and Rs. 600 per acre -- compared to maximum costs of Rs. 350 and Rs. 400 for local varieties -- (usually much less in the case of farmers who do not use optimum inputs), the dimensions of loss resulting from water shortage would be so large that no farmer would consider adopting I. R. 8 without supplementary water facilities.

Notwithstanding the potential gain, the average cultivator is still faced with the immediate problem of finding some Rs. 6,000 to Rs. 8,000 to finance an open well or tank and pumpset. Yet, as in West Godavary, the agro-economic pattern, and the tenorial system are both so unfavorable that the overwhelming majority of cultivators cannot hope to accumulate the large capital surpluses necessary to participate in the benefits of the new technology. In Palghat, as in West Godavary, the success of the package program has been confined to the irrigated portions of the district "where the bulk of the cultivators with size of holding greater than 10 acres is concentrated."<sup>2/</sup>

<sup>1/</sup> These estimates presuppose the use of optimum practises for both traditional and high-yielding varieties, and are taken from the records of a progressive farmer in Palghat, Shri T.G. Narayanaswamy, Palathully Village, Coyallamannam Block.

<sup>2/</sup> IADP, Palghat, Progress Report, 1961-62 to 1967-68, 4.

## I

According to agro-economic surveys conducted in Palghat District in 1962-63, 55 percent of all cultivators had holdings of less than five acres, 34 percent less than 2.5 acres. Five to ten acre holdings accounted for another 22 percent, and an almost equal proportion of 23 percent represented farms of ten acres or above. As in West Godavary and other parts of the rice belt, however, the majority of the cultivated area, over 60 percent, was operated in holdings of ten acres or more; an additional 23 percent of the area was farmed in holdings of five to ten acres. By contrast, holdings of 2.5 acres to 5 acres accounted for only 10 percent of the cultivated area; and holdings of less than 2.5 acres for only 5 percent.<sup>1/</sup>

Actually, the estimates of the Joint Director, IADP, Palghat suggests an even more unfavorable distribution of operational holdings. His judgment is that over 80 percent of all cultivators operate holdings of five acres or less, and account for as much as 46 percent of the area under paddy. Estimates supplied in the villages visited tend to support these higher figures. For example, in Kuthanoor village, 67 percent of all cultivating families operated holdings of five acres or less and accounted for 42 percent of the land; in Mathur village, 84 percent of cultivating households had holdings of five acres or less, accounting for 48 percent of the land; in Mannar-ghat village, fully 95 percent of all cultivators operated holdings of five acres or less, accounting for 65 percent of the land. In any case, if one accepts the estimate of the Joint Director, IADP, Palghat, that five acres of irrigated land is the minimum necessary for an economic holding in the District, it is clear that the overwhelming majority of cultivators cannot be included in this category.

In fact, it is precisely this assessment of the majority of farmers, i. e., as uneconomic, that has guided the IADP staff in formulating its approach to intensive development in the District. Assuming that the majority of cultivators operate either at a loss or with only marginal surpluses, the development staff has made virtually no effort to bring small farmers into active participation in the Package Program or the High Yielding Varieties Program. In essence, the IADP has operated only through the minority of large farmers in Palghat District.

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<sup>1/</sup> Intensive Agricultural District Program, Second Report, (1960-65), 324.

For example, virtually no extension effort has been made to instruct small farmers in proper cultivation practises for the high-yielding varieties. As a result, even if some cultivators were willing to take the financial risk of participation, they would still not have access to good technical advice, e. g., how to cope successfully with the serious problem of plant disease.

Unfortunately, the IADP staff's assessment of the majority of farmers as incapable of participating in programs of agricultural modernization is well founded. Apart from the tiny size of most farms, which is in itself a crippling limitation, most small farmers also are handicapped in accumulating surpluses for investment by deductions from net returns representing payments of rent under a ubiquitous tenancy system.

The land tenure system found in Palghat District is distinct from those in other parts of the South.<sup>1/</sup> Actually, the origins of the land system in Kerala as a whole are shrouded in myth. According to legend, an incarnation of Lord Vishnu raised Kerala from the Arabian Sea and presented the land to a class of Namboodri and Malayalee Brahmins or Jemmies as their permanent birthright, (jenmom.). In fact, prior to Independence, the major portion of the land in the areas now comprising Kerala, i. e., the erstwhile States of Travancore and Cochin and the District of Malabar, formerly administered by the British as part of the Madras Presidency, was owned by a tiny class of jenmies.

Actually, the jenmom right was enjoyed by three different categories of owners; Brahmaswams or individual Brahmins; Devaswams or Hindu temples; and major chieftains, warriors and captains of the Kings in the princely States, belonging mainly to the Nair community. The jenmies rarely cultivated the land, leasing out some 99 percent of their holdings.

Palghat District is located in the ex-Malabar region; i. e., the part of Kerala that was formerly administered as a portion of the Madras Presidency. However, the agrarian pattern in Palghat closely resembled arrangements in other parts of Kerala, namely Travancore and Cochin. In all these areas, it had become the practise for Jenmies to transfer a part of their interest in the land to a tenant, in return for

<sup>1/</sup> A summary of the history of the land tenure system in Palghat District is available in Kerala State, District Census Handbook, 3. Palghat, Census, 1961 (Kerala, 1965).

the payment of a lump sum in money or in kind, and an additional nominal payment of rent, and other customary fees and dues. Such transactions were duly recorded in registered leases. In such cases, the tenant, known as Kanomdar acquired the right, kanom, of holding the property for a period of twelve years, after which the contract might be renewed at the pleasure of the jenmi. While the tenant was legally liable to eviction at the expiry of the contract period, in practice, kanom rights were usually hereditary, and passed on from one generation to the next.

When the first Congress Ministry came to power in Madras in 1937, one of the land reforms it carried out was to confer hereditary tenancy on kanomdars, relieving them of the necessity of renewing these leases every twelve years. After Independence, new land reform laws passed in the States of Travancore and Cochin also gave occupancy rights to kanom tenants and fixed the amount due annually to jenmies on a permanent basis. Recently, the rights of the jenmies were completely extinguished in Travancore by the Jenmi Kanom Compensation Abolition Act which provided for the payment of a lump sum to the jenmies in compensation for the loss of any remaining rights in the land; and a similar reform is also in progress in Cochin. As a result, in both areas, kanomdars are now full proprietors and enjoy the status of ryotwari tenure, coming into direct relationship with the State. Jenmies still exist in the ex-Malabar region, i.e. Palghat, but kanom tenants are almost in as favorable a position as their counterparts in Travancore and Cochin, paying only some 5 percent of the total produce as rent annually, and enjoying the right to transfer their interests in the land.

All of these reforms, however, frequently failed to have any impact on the status of the actual tiller of the soil. Many of the kanomdars had become intermediaries, leasing out portions of their land to cultivating tenants known as verompattomdars. Legally, the verompattomdars were tenants at will. Again, however, in many instances, they came to enjoy hereditary rights by the "custom of the locality." Even though the verompattomdar was required to renew his lease after a fixed period, and could be evicted at the will of the landlord, customary relationships between landlords and tenants extending over two or three generations became common. By contrast, there was always<sup>a</sup> residual category of cultivating verompattomdars who did not have hereditary rights, and cultivated the land only for limited periods at the will of the landowner.

In Palghat District, the overwhelming majority of cultivators are customary verompattomdars. In the villages visited, 75 percent to 95 percent of all cultivating households operated holdings on verompattom tenure. On the whole, it is estimated that about 60 percent to 70 percent of the area in the district is currently cultivated by verompattom tenants.

The permanent rights of verompattom tenants were strengthened under the Kerala Land Reforms Act of 1964, which conferred security of tenure on all tenants; and prohibited evictions except in the case of court order showing adequate cause, mainly non-payment of rent. The 1964 Act also included a schedule which laid down principles according to which "fair rent" should be fixed for all leased out land. The Act further provided that the tenant could file an application with the Land Revenue Tribunal, composed of officers of the judiciary to have the "fair rent" fixed.

The provisions of the 1964 Act prohibiting eviction of tenants have generally been possible to enforce in the case of customary verompattomdars. They usually have proof of possession, including in many cases, receipts for rent. Also, there are now relatively accurate land records at the headquarters office of the revenue village, that have been constructed over the last few years to implement the State Government's program of procurement of foodgrains through a levy of paddy on all holdings above two acres. (However, there is still a category of tenants cultivating on oral lease who are excluded from these records; and at present, it is impossible to make any estimate of their numbers.)

The 1964 Act has been less successful in ensuring cultivators the fair rent. Although an increasing number of verompattomdars have applied to the Land Tribunals over the last few years, most tenants are still inhibited from claiming their rights because the court procedure involved is time-consuming, costly and complicated; and more important, because they fear to damage their "good relationship" with the landlord. While customary ties are rapidly eroding, and landowners do not share any of the costs of cultivation, still, in cases where good relations exist, the landlord may advance interest-free production loans and other facilities to the tenant in time of need. Since the tenants have so far been unable to find any institutional support for such purposes, many have preferred to conciliate the

landlord by neglecting to apply for fixation of fair rent. For their part, the landlords have been content to receive the customary rates, and have not tried to raise rentals. One result is that the burden of tenancy falls unevenly among cultivators. For example, a verompattomdar having access to irrigation can increase his yields by higher applications of chemical fertilizers, and in the process reduce the relative proportion of the crop paid as rent to as little as one-fourth of the total produce. However, in the case of cultivators without assured water and/or without adequate finances to invest in modern inputs, the burden of rent at customary rates -- assuming static yields -- can be as high as 60 percent.

Notwithstanding these handicaps, the majority of cultivators in Palghat District have experienced some improvement in yields -- ranging from about 25 percent to 60 percent -- over the last five years. Mainly, this has come about as a result of the application of small doses of chemical fertilizers and pesticides and the adoption of more labor-intensive techniques. While some of these gains have been absorbed by rising costs for fertilizers, and higher wages for labor, many cultivators report some modest improvement in their standard of living, mainly in the quality and quantity of food and clothing consumed. Others have managed some margin for the construction of cattle sheds; or tile roofing of houses; or buying of gold ornaments; or purchase of working bullocks or buffalo for milk selling. Yet, as a group, this great majority of verompattom tenants have not been able to accumulate any surplus for investment in land improvement, especially minor irrigation. As a result, they report that cultivation of the high-yielding varieties is much too risky, and they have no plans to try them.

## II

Although credit cooperatives in Palghat District are considered the most successful in the State, still they offer only modest help to the majority of small farmers. About 80 percent of all cultivating families are members of primary agricultural credit societies; but only 50 percent to 60 percent of members actually take loans; <sup>1/</sup> and most small farmers do not borrow up to their maximum borrowing limit.

<sup>1/</sup> Estimates supplied by the Secretary of the Palghat Cooperative Central Bank. Information on the operation of the crop loan system as presented in the following paragraphs were gathered during interviews with the Chairman and Secretary of the Palghat Central Cooperative Bank and from written and mimeographed statements furnished by them.

The Palghat Central Cooperative Bank operates under the crop loan system. The scale of finance for paddy per acre is fixed both for cultivation of local varieties and high yielding varieties. In each case, it is divided into cash and kind components. For the cultivation of local varieties, each member is entitled to production credit of Rs. 350 per acre, which is divided into three portions: Part A of Rs. 175 cash; Part B of the recommended fertilizer dose valued at Rs. 200; and Part C of an optional cash loan of Rs. 100 to meet the labor costs associated with the application of fertilizer. Under the high-yielding varieties program, these amounts are increased to a total of Rs. 475, composed of cash, kind and supplemental cash components valued at Rs. 175; Rs. 200 and Rs. 100 respectively. Of the approximately 200 primary agricultural credit societies that are members of the Palghat Central Cooperative Bank, about 50 percent have established individual maximum borrowing limits for short-term and medium-term credit of Rs. 5,000; and an equal number have doubled this amount to Rs. 10,000 with the division between short-term and medium-term advances left to individual societies.

The scale of production credit now established seems adequate to meet the cultivation costs of paddy, especially of locally improved varieties on which no more than Rs. 350 or Rs. 400 is normally expended, even with optimum practises. For the high-yielding varieties, the scale is less satisfactory, the total loan available in cash and kind amounting to Rs. 475, compared to estimated production costs of Rs. 550-600 per acre. Nevertheless, those small farmers who belong to the cooperatives rarely draw even this maximum limit. There are many reasons for this: small farmers are afraid of incurring large debts to the cooperative society which they may not be able to repay. In fact, some have already become defaulters and are no longer eligible for loans. Moreover, since small farmers cannot afford minor irrigation facilities, and are particularly vulnerable to the vagaries of the monsoon, they hesitate to make large investments on fertilizer. This is reflected in the experience of the Palghat Cooperative Bank, which used to insist that members draw all three components of the crop loan; but now permit cultivators to draw the Part A cash portion only, in recognition that many farmers do not want to use chemical fertilizers in the prescribed proportions. Since the cooperatives are still the only distribution agent for fertilizer in Kerala, the poor offtake reflects the small farmers unwillingness to risk heavy outlays on modern inputs as long as there is no assurance

of adequate water. In fact, with crop failures a common occurrence, small farmers try as far as possible to remain out of debt entirely, or to take very small production loans, only when absolutely necessary. There is an additional constraint: most farmers need consumption loans sometime during the year. This can only be provided by private sources, in many cases from moneylenders who charge 30 percent to 40 percent interest on the loans advanced. The first charge on the crop is therefore debt repayment to private lenders, and this further diminishes the small cultivator's capacity to repay loans from the cooperatives.

It is true that between 1964-65 and 1968-69, short-term production credit advanced by the Palghat Central Cooperative Bank increased from almost Rs. 40 lakhs to over Rs. 80 lakhs. But inability to make the majority of small farmers active participants in the new technology is indicated by the growing disparity between package loans sanctioned and package loans actually issued during the same period. In 1964-65, when farm plans were still drawn up mainly for large farmers, package loans of over Rs. 50 lakhs were sanctioned; and almost 40 lakhs were issued. In 1968-69, when coverage was extended to include a larger proportion of small cultivators, the corresponding figures were Rs. 148 lakhs and Rs. 80 lakhs.<sup>1/</sup> Moreover, in 1968-69, total, overdues on package loans amounted to about 26 percent.<sup>2/</sup> The failure of the Palghat Central Cooperative Bank to find methods of reaching the small farmer is clearly revealed in the fact that over the last two years, offtake of short-term loans has actually declined, (from Rs. 191 lakhs to Rs. 80 lakhs), and that like the rest of the Central Cooperative Banks in Kerala, Palghat now has more funds to lend than can be absorbed. At present, the borrowing reserve of the Palghat Central Cooperative Bank is Rs. 417 lakhs; by contrast, the total of short-term and medium-term loans advanced in 1968-69 was Rs. 93 lakhs.<sup>3/</sup>

1/ IADP, Palghat, Progress Report, 1961-62 to 1967-68, 8.

2/ Ibid., 9

3/ From a statement prepared by the Additional Registrar, Cooperation, Kerala State, Trivandrum.

## III

The largest proportion of the agricultural population in Palghat District -- about 55 percent -- are farm laborers. If anything, their condition has shown less improvement than that of the small farmers over the past five years. Most laborers still maintain a permanent working relationship with one landowner; in some cases, they are also permitted to seek casual labor during the slack season, when work is not available on the home farm. One factor reinforcing such traditional ties is the general redundancy of agricultural labor in Palghat District. In striking contrast to Ludhiana, and even to West Godavary, farm laborers face serious problems of underemployment. As a result, laborers are reluctant to break permanent ties with landowners which are a source of job security and also of fringe benefits that would be lost if they took work as casual workers. One effect of this unwillingness to challenge the landowners is that the new wage rates prescribed for Agricultural laborers by the Agricultural Minimum Wages Act, 1969, is generally not enforced. According to the Act, cash wages for day labor are set at Rs. 4.5 per day for men; and Rs. 3 for women. Payments in kind for harvesting have also been raised from one share in ten to one in eight. However, laborers commonly report lower wages than the legal minimum for casual day work; and many also receive lower rates for harvest.

Over the past five years, agricultural laborers have experienced very meager improvements in their standard of living, perhaps some modest increases in the quantity of food taken or clothing. Some laborers report no improvement at all, or a deterioration in their standard of living due to rising prices. A major problem is that employment opportunities have not significantly increased over the last five years. Laborers report they find agricultural work for only 180 to 200 days a year. It is true that over the last five years, wages for day work have increased from about Rs. 1.5 to Rs. 3 for men and from Rs. 1.25 to Rs. 2 for women, payable either in cash or kind at the worker's preference. In some cases, workers are also receiving the higher rates for harvesting operations, i. e., a share of one-eighth instead of one-tenth, valued at about Rs. 3 per day. But on the average, an agricultural laborer in Palghat District probably does not make more than Rs. 600 to Rs. 700 per annum. Possibly the rise in cash wages has been sufficient to keep pace with the rise in the cost of living. But the lack of alternative employment opportunities,

and the subsistence standard at which most laborers live, keeps them dependent on the landowner for extra concessions to tide them over the lean times of unemployment. For example, laborers report they receive interest-free loans from their employers; some clothing at the end of the year; gifts at marriages or festivals; medical care; and perhaps an extra bonus payment of paddy annually. One is inclined to conclude that it is these marginal additions to income that actually make the difference to the laborer's capacity to survive even at his present low levels of subsistence.

#### IV

All this does not mean that Palghat presents a picture of unrelieved agricultural backwardness. What it does convey is that the benefits of the new technology are presently accessible only to a small minority of cultivators, those who already enjoy a broad array of other advantages: holdings in the irrigated area of the district; economic units of operation; and genmom or kanom rights in the land. Actually, from the very beginning of the IADP program, there were striking gains in yields from higher applications of modern inputs in the irrigated areas of the district. For example, taking the district as a whole, the indices of increase in yield rate in 1967-68 over the base period 1959-60 to 1961-62, were about 14 percent for the kharif or Viruppu crop, and no more than 1 percent for the rabi or Mundakan crop; but in blocks having canal irrigation, the increase was as high as 57 percent for Viruppu and 30 percent for Mundakan.<sup>1/</sup> Moreover, starting in 1965-66, farmers in the irrigated areas availed of generous state subsidies for the installation of minor irrigation works, at the rate of 25 percent for electric engines; and 50 percent for diesel engines. In the district as a whole, the number of pumpsets distributed rose from 79 in 1964-65 to 1,592 in 1967-68, and in the latter year demand exceeded supply by about 1,000. Similarly, demand for tractors more than trebled between 1965-66 and 1967-68, bringing the total number in the district to 377.<sup>2/</sup> Once again, non-availability, and not lack of demand, was the limiting factor in the distribution of more machines.

<sup>1/</sup> IADP, Palghat, Progress Report, 1961-62 to 1967-68, 12.

<sup>2/</sup> Ibid., 5

Nevertheless, as the Joint Director, IADP, Palghat is quick to point out, all of these gains were concentrated in the irrigated portions of the district, among farmers with holdings of ten acres or more. Inevitably, it was this group of farmers that also benefitted most from the introduction of the high-yielding varieties. When Tainan-3 was first taken up in 1965-66, threshing difficulties and the glutinous quality of the strain caused cultivators to reject it. But in 1966-67, I.R. 8 was introduced and found acceptable. In addition, the Kerala Agriculture Department developed the new hybrid Anna-purna, with a yield level of over 4100 pounds per acre, and greater resistance to disease. Since then, the adoption of the high-yielding varieties in Palghat district has expanded slowly. By 1968-69 only 17,441 acres were covered under the Viruppu crop (about 6 percent of the total acreage), and 28,977 under Mundakan, (about 13 percent). Altogether, about one-tenth of the gross-cropped area, almost 46,500 acres, has so far come under the high-yielding varieties.<sup>1/</sup> But cultivators who have adopted these strains are almost exclusively the small minority with ten acres or more. The Progress Report for 1967-68 observes:

The package program has been highly successful in increasing the income of the cultivating households as is evident from the increased demand for tractors and pump-sets. But this success is confined to the blocks in the Palghat Revenue Division where all the major irrigation schemes are situated, and also where the bulk of cultivators with size of holding greater than ten acres is concentrated. With the advent of the high yielding varieties of paddy, the income of the cultivating households has considerably increased and this additional income is now being invested in capital investments. The purchase of large numbers of tractors and pumpsets and the utilization of large amounts of money for conspicuous consumption such as construction of new houses go to show that the cultivators in the ayacut areas of major irrigation schemes have benefitted considerably from the implementation of the package program.<sup>2/</sup>

<sup>1/</sup> Ibid., 9.

<sup>2/</sup> Ibid., 4.

## V

The social costs of relying on a small minority of large farmers to spearhead the process of agricultural modernization are nowhere more obvious than in Kerala. In fact, the situation in Kerala suggests that while it may be economically advantageous to adopt an agricultural strategy based on the larger farmer, in some areas at least, it is no longer socially feasible or politically desirable to do so.

In Kerala State as a whole, after nearly ten years of static production levels, of 9 to 11 lakh tons of paddy per year, output jumped between 1967-68 and 1968-69 from 11.2 lakh tons to 14.09 lakh tons,<sup>1/</sup> largely as the result of the introduction of I.R. 8 over approximately one-fourth the gross cropped area. State officials believe that if some 50 percent of the gross area could be covered with I.R. 8, Taichung Native 1 and Annapurna by the end of the Fourth Plan Kerala's food deficit would be eliminated.

At the same time, it is clear that the major political parties in the United Front Government, i. e. the CPI(M) and CPI are less interested in exploiting the production potential of the new technology than the social discontent unleashed by widening disparities among landowners and laborers, and landlords and tenants. An additional complication is the competition between the two parties for popular support among the most numerous elements in the agricultural population, i. e., landless laborers and tenants. Outbidding one another in their promises of benefits to these groups, the leftist parties have not only contributed to a sharp acceleration in the aspirations and demands of the most impoverished sections of the population, but they have also created an atmosphere of insecurity among the large farmers on whom the major burden of agricultural modernization has been placed. Probably most frightening to this class is the marked deterioration in relations between landowners and laborers in many parts of the State over the last couple of years.

In Palghat, the problem of confrontation between the landless and the landowners is still not acute. On the whole, traditional ties persist, partly because of labor's poor bargaining position; and partly as a function of the paternalistic attitude traditionally adopted

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<sup>1/</sup> Data supplied by the Office of the Director, Agriculture, Kerala State, Trivandrum.

by the landowning class. Even so, the CPT and the CPI (M) have already had some success in recruiting younger laborers for membership in village unions, the main object of which is to get better wages and working conditions, and especially to begin agitation for effective enforcement of the Minimum Wages Act. Actually, large farmers doubt that despite the long history of "good relations" in Palghat District, laborers will long resist Marxist propaganda which argues that "the land you work with your hands is yours; tomorrow you can live in the big house of the landlord." Indeed, in anticipation of any agitation for implementation of the Agricultural Minimum Wages Act, landlords are already thinking in terms of stopping traditional bonus payments of paddy or other articles in kind at the time of festivals or other religious occasions, and of withdrawing any other facilities like loans and advances. Some have said that they will keep their land out of cultivation entirely if any effort to enforce higher wages is made. Others see a remedy in mechanization. By 1968-69, there were already 430 tractors in Palghat District,<sup>1/</sup> and the joint director estimates he could immediately dispose of an additional 1,000 without any subsidy, the major source of attraction being not greater efficiency in farm operations, but the opportunity to be rid of the laborers.

Even in Palghat, there have already been instances, although they are still **rare**, of direct confrontations between landowners and laborers over the issue of wages. In Chittor village last year, a laborer loyal to a local landlord was murdered when Marxist led agricultural workers attempted to prevent the landowner from transplanting paddy with non-unionized workers. Again, during the kharif season in June 1969, two separate clashes occurred between farmers and agricultural laborers, each side armed with knives and sticks, over the issue of agricultural wages.<sup>2/</sup>

Moreover, while Palghat remains relatively quiet, the large farmers are acutely aware of the sharp polarization between landowners and laborers that has already emerged in the second IADP District of Alleppey. In Alleppey, in the wake of constant political agitation by rival communist parties, some groups of agricultural

1/ Figures supplied by the Joint Director, IADP, Palghat

2/ See The Statesman, June 15, 1969.

laborers are refusing to harvest the crop and/or divide the crop on the farmer's threshing floor unless they receive one-fifth or even one-fourth of the crop as their share. Others are engaging in work slowdowns that delay planting of the second crop and cause severe losses to the landowners. Laborers unions have also "forbidden" the use of tractors for ploughing (which they argue displaces 40 men per acre during the peak sowing season), and they have tried to enforce this dictum by surrounding tractors in the field and preventing owners from using them. Many landowners have responded in kind, threatening not to cultivate their fields, and some have, in fact, left them fallow. Others have refused to take a second crop in order to rob the laborers of their main advantage -- the necessity for rapid harvesting -- at the end of the Viruppu season. In fact, in Aleppey, which accounts for one tenth of the gross acreage under paddy in the State, the entire cycle of agricultural production has been disrupted by constant agitations, demonstrations and riots by agricultural laborers. In April, 1969, it was feared that one-fourth to one-fifth of the standing crops would not be harvested. Landowners have become concerned for their physical security. This kharif a majority of farmers were reported as refusing to cultivate a second crop. In response, the laborers threatened to seize the land and cultivate it themselves. Even when agricultural operations are carried on, therefore, they proceed in an atmosphere of fear and uncertainty which sharply limits the possibilities of increasing production.

If the large landowners are unwilling or unable to be an effective agent of agricultural modernization, the prospects of transforming the small farmers into economic producers, given their present resource base, seems little more encouraging. In Palghat District, the Marxists have based their strongest appeal to the tenants; they have used the theme of "land to the tiller" in winning local elections. Both the landowners and the tenants now generally believe that full ownership rights over leased out land will ultimately be vested in the tenants.

Ever since the Kerala Land Reforms Act of 1964 legally prohibited the eviction of customary verompattom tenants, relations between landowners (whether jenmies or kanomdars) have sharply deteriorated. Landlords have tended to withdraw all customary facilities from the tenants, including advances for production and other loans in times of

emergency, illness or marriage. The tenants, for their part, have refused to recognize any right of the landlord beyond that of collecting rent, e. g., they will not accept advice about cultivation practises, and in some cases, will not even permit the landlord to sit at his field.

This atmosphere of strain has been considerably increased by the recent introduction of the Kerala Land Reforms (Amendment) Bill, 1968, which provides that on date to be notified by Government all intermediary rights in land, including those currently enjoyed by Hindu temples and kanomdars will vest in the Government, subject to compensation at sixteen times the fair rent. Subsequently, rights of ownership are to be assigned to cultivating tenants; and rent payable to the landlord will be collected by the State, and adjusted toward the purchase price of land.<sup>1/</sup>

As always, there will be some evasion. Reports are already current of landowners coming to private agreements with verompottom tenants, gifting them outright with one or two acres in exchange for voluntary surrender by the tenant of rights in any remaining land in his possession. Nevertheless, given the existence of relatively accurate records of verompottom tenures in Kerala, the Land Reforms Act will probably achieve its aim of transferring ownership rights to the large majority of verompottom tenants. Yet the impetus to agricultural modernization of such a reform is questionable. Unless the State Government intervenes with a massive program of financial and other support for the small farmer, (which is highly doubtful given the present precarious budgetary position), the new owners will find themselves the proprietors of uneconomic holdings of two or three acres with no capital to invest in land improvement and modern methods.

In fact, the case of Kerala calls attention to what may be an increasing constraint on the prospects of the IADP approach to agricultural modernization, especially in the rice areas. That is the desire of radical and populist parties to exploit the social discontents arising out of increasing economic disparities for political gains, rather than to develop the potentialities of the new technology for solving problems of production. The CPI(M) leaders, at least, have been frank in stating that under present economic and political system, United Front Government's can bring about only marginal relief to

<sup>1/</sup> See The Kerala Land Reforms (Amendment) Bill, 1968 (L. A. Bill No. 35 of 1968) (Trivandrum, Government Press, 1968).

people; the primary goal of the leftist parties should be to strengthen the radical forces for change by unleashing popular discontent. It seems probable that this, and not increasing production, is the major purpose of both the Kerala Land Reforms (Amendment) Bill of 1968 and the Agricultural Minimum Wages Act of 1969.

BURDWAN

Burdwan District, like West Bengal as a whole, has traditionally been a predominately mono-cropped paddy area. In 1967-68, the main Aman (winter) crop accounted for 10.6 lakh acres out of 11.3 lakh acres under paddy—about 92 percent of the total. Cultivation of Aman paddy is distinctive for two reasons. First, sowing and transplantation begin during what is considered the middle of the kharif season in other parts of India, i.e., in July or August, and harvesting takes place during the middle of the rabi season, in mid-December or January. Usually, therefore, cultivators have no time to plant either a kharif crop prior to transplantation, or a rabi crop after harvest. Second, to yield well, Aman paddy must be grown under flooded conditions.

The peculiar characteristics of the Aman cropping pattern represent an adaptation to the local topography and available supplies of water. Most of the Aman crop is cultivated on medium or low lying ground; yet the amount of water that ultimately reaches farmers' fields is not subject to regulation. In fact, in normal weather years, standing water in the fields is so high that paddy must be cultivated under flooded conditions over the major part of the area.

Less than 50 percent of the gross acreage under paddy is currently served by canal irrigation. The Damodar Valley Corporation (DVC) supplies irrigation water to about five lakh acres; the smaller Mor project to an additional 30,000 acres. Yet, even the DVC does not have a network of field channels for the regulation of irrigation water at farmers' fields; instead, the project supplies water through canals which operate according to a flood system. As a result, the level of standing water in farmers' fields, both in canal irrigated and rainfed areas, depends heavily on the strength of the monsoon.

On the average, Burdwan District receives 40" of rainfall between June and September; yet the actual volume of rainfall from year to year is highly erratic. When the monsoon fails, the DVC system, which itself depends on rainfall for irrigation water, cannot meet the normal requirements of the Aman paddy crop. For example, a serious failure of the monsoon both in 1965-66 and 1966-67 followed by a partial failure in 1967-68, led to the progressive reduction of total output, and in

some parts of the district to "near famine conditions." 1/ By contrast, in normal years, fields in both the rainfed and canal irrigated areas are flooded. In fact, under the DVC system, a good deal of water is wasted for agricultural purposes; it is estimated that about 25 percent to 30 percent of irrigation water is annually allowed to run off into the Bay of Bengal. In years of particularly heavy monsoons, the standing water in the fields is sometimes so high that it does damage to the crops. Finally, since the DVC is dependent on rainfall for irrigation water, and the annual incidence of rainfall in Burdwan District during the rest of the year is normally no more than 10 or 15 inches, the DVC can supply adequate water for a second crop only over 25,000 acres.

It is for these reasons of inadequate water supply that double cropping has always been very limited in Burdwan District. At the time of the introduction of the IADP in 1962, the net sown area was about 11.7 lakh acres, of which only some seven percent was double-cropped. Most of this represented uplands areas where cultivators took either an aus variety of paddy—a photo-insensitive and quick maturing plant which could be sown by broadcast method in April or May and harvested in October—followed by a second crop of wheat; or jute, followed by potato. On a slightly lower land, it was possible to take a transplanted variety of aus followed by wheat; or an early Aman variety—maturing one month sooner than normal Aman—or jute, followed by potato. Finally, there was very limited scope for a second summer or boro crop of paddy in medium or low-lying areas, having both abundant supplies of water and soils with good moisture retentive capacity.

The major achievements of the IADP in Burdwan District between 1962-63 and 1968-69 was to increase the irrigation potential by about 1 lakh acres during the main Aman season and by about 52,000 acres during the second or rabi season; and to expand the opportunities for double-cropping. Approximately one-third of the new irrigation potential (in both the Aman and rabi seasons) was created by government investments in medium irrigation projects. These included 182 Deep Tubewells installed by the State, each with a command area of about 150 acres during Aman and 75 acres during rabi; and 53 River Lift Irrigation Schemes, each commanding 200 acres during Aman and 100 acres during rabi. The balance of two-thirds of the new irrigation potential represented private investments by individual farmers in tanks, pumping sets and

1/ A Short Note on the Progress of Intensive Agricultural District Program, Burdwan for the Year, 1968-1969, 5. Mimeo

shallow tube-wells. 1/ As a result, between 1962 and 1969, the total area under double cropping increased from 7 percent to about 20 percent, raising the gross cropped acreage from 12.58 lakh acres to about 14 lakh acres. Gross area under paddy also increased, from 10.8 lakh acres to 11.3 lakh acres, as some cultivators took a second summer or boro paddy crop; the remainder of the rabi area was brought under high-yielding varieties of wheat, potato, vegetables, pulses and mustard.

Up to 1967-68, therefore, the greatest beneficiaries of the IADP approach were those relatively few farmers whose holdings fell within the area covered by State-sponsored Deep Tubewell or Lift Irrigation Schemes; and those individual cultivators who could afford to invest in supplementary irrigation facilities, especially tanks, pumpsets and shallow tubewells. This latter class included farmers with compact holdings of five acres or more, who were eligible for the Department of Agriculture's loan and subsidy scheme, under which diesel and petrol driven pumps were made available at 30 percent subsidy, with the balance of the cost of the pump—some Rs. 3,000 to Rs. 4,000—repayable in five annual installments. The major benefits to farmers of additional irrigation facilities were higher yields from Aman paddy with increased dosages of chemical fertilizer; and the ability to take a second crop of summer or boro paddy, or high-yielding wheat varieties. During 1969-70, it is proposed to increase the irrigation potential by another 45,000 acres. In a special effort to distribute the benefits even more widely among small farmers, the State Government has recently decided to extend loans for shallow tubewells to cultivators with as little as two acres of compact land, and on terms that do not require more than a down payment, or deposit, of Rs. 62—some 2 percent of the total value of the pumping sets.

Despite these achievements, however, the aggregate production of rice in Burdwan District between 1963-64 and 1967-68 actually declined somewhat from about 658,000 tons to 621,000 tons, at least partly due to poor rains during three successive seasons, beginning with 1965-66. The yield rate of rice per acre also showed a steady decline during this entire period. With the introduction of the high-yielding paddy varieties in 1968-69, including I.R. 8, Taichung Native 1, and locally developed indica varieties, NC 678 and NC 1281, on some 1.1 lakh acres, (and the benefit of a good weather year), the production of rice did increase to 725,000 tons, and yields per acre also rose, but not to levels significantly higher than those previously achieved in 1963-64. 2/

1/ Progress in extending the irrigation potential of the district and multiple cropping is summarized in Ibid., 4.

2/ Ibid., 5

There are a number of serious obstacles to the widespread cultivation of the high-yielding paddy varieties in Burdwan District. First, the topography of the land is generally unsuitable during the main Aman season. With most of the area at medium or low levels of elevation, and no means of regulating the flow of water at farmers' fields, the standing water in fully three-fourths of the area planted under rice would be too high for the dwarf varieties, and the plants would be submerged. At most, about 300,000 acres would escape this difficulty. Second, in addition to adequate water, the high-yielding paddy varieties need about 12-13 hours of sunlight daily to produce optimum yields. However, during the main Aman season cultivation occurs under the heavy cloud, cover of the monsoon. Even when adequate drainage facilities are available, therefore, yields from the high-yielding varieties are reduced below the optimum for want of sunlight—although they may still be somewhat better than levels achieved with local varieties. For many cultivators, this advantage is cancelled out by the higher costs of cultivation, and the greater incidence of plant diseases. Actually, in the conditions of Burdwan District, the best period to grow I.R. 8 is during the dry and sunny summer season as a boro crop. But while sunlight conditions are optimal, most cultivators do not have the supplementary minor irrigation facilities that are necessary to take a second paddy crop.

Once all these limitations are taken into account, the major advantage of the high-yielding varieties in Burdwan District can be summarized as following. Where the topography is suitable, i.e., over a maximum of 300,000 acres, shorter duration, high yielding strains can be substituted for local varieties, to convert a portion of the mono-cropped area into double cropped land. This possibility arises from the opportunity to harvest I.R. 8 approximately one month earlier than traditional Aman varieties, and to use the water thus saved for a second crop of either wheat, potato or vegetables, or pulses and mustard, which can be grown with residual moisture in the soil.

Nevertheless, given the constraints imposed by topography and the irrigation system, the main opportunity for increasing yields and output in Burdwan remains the greater utilization of modern inputs, especially fertilizers and pesticides, on local varieties during the main Aman season. Looked at from this perspective, and taking into account the poor performance of the IADP over the last six years, the major obstacles to agricultural modernization appear to lie less with unsuitable topography or inefficient utilization of water, serious as these problems are, than with an extremely unfavorable agro-economic pattern, characterized by uneconomic farms, often cultivated in several tiny fragments, and a highly iniquitous land tenure system under which the majority of agriculturists have neither the means nor the incentives to invest in modern methods of production.

## I

Agro-economic data for Burdwan District alone are not available. In West Bengal as a whole, the 1960 Census reported the following distribution of operational holdings: over 46 percent were less than 2.5 acres; an additional 26 percent were between 2.5 acres and five acres. Only a little over 8 percent of all holdings were ten acres or above; another 19 percent were between five and ten acres. Actually, village records in the three Blocks visited in Burdwan District, revealed an even more sharply skewed picture. In Jamulpur Block, a canal irrigated area having a relatively high incidence of double-cropping, four acres of land is considered an economic holding; i.e., sufficient to maintain an average family of five or six persons. Yet, in the three villages selected, the majority of agricultural families, ranging from 51 percent in Ruppore village to 54 percent in Selimabad village to 58 percent in Habashpur village were either landless or had holdings of less than one acre. An additional 26 percent, 29 percent and 22 percent respectively had farms of one to three acres. The remainder, ranging from 23 percent in Ruppore to 17 percent in Selimabad and 20 percent in Habashpur had holdings of three acres or more. In Selimabad, the only village for which data was available on the acreage cultivated under each size of holding, about 70 percent of the land was cultivated in farms of three acres or less; 14 percent in holdings of three to five acres; and only two percent in farms of eight to ten acres.

In Galsi-II Block, where irrigation is generally sufficient to assure one crop only—the typical situation in the District—and a six acre holding is considered the minimum size necessary for an economic unit, data on the distribution of operational holdings for the three villages visited (Babla, Sarul and Bardighi) reveal a larger number of economic holdings, but also a greater degree of concentration of land. Available data for each village is given below:

BABLA VILLAGE

<u>Distribution of Landholdings</u>	<u>Number of Families</u>	<u>%</u>	<u>Area (acres)</u>	<u>%</u>
Landless laborers	25	20	—	—
Landless share-croppers	24	19	95	20
1-3 acres	35	27	70	15
3-6 acres	27	21	135	29
6-12 acres	12	10	108	23
12-20 acres	<u>4</u>	<u>3</u>	<u>64</u>	<u>13</u>
	127	100	472	100

SARAL VILLAGE

<u>Distribution of Landholdings</u>	<u>Number of Families</u>	<u>%</u>	<u>Area (acres)</u>	<u>%</u>
Landless laborers	67	38	—	—
Landless share-croppers	25	14	149	21
1-3 acres	30	17	75	10
3-6 acres	20	11	100	14
6-12 acres	20	11	200	27
12-20 acres	<u>16</u>	<u>9</u>	<u>201</u>	<u>28</u>
	178	100	725	100

BARDIGHI VILLAGE

<u>Distribution of Landholdings</u>	<u>Number of Families</u>	<u>%</u>	<u>Area (acres)</u>	<u>%</u>
Landless laborers	58	53	—	—
Landless share-croppers	15	14	30	11
1-3 acres	12	11	25	9
3-6 acres	8	7	40	15
6-12 acres	10	9	75	28
12-20 acres	4	3	55	20
Above 20 acres	<u>3</u>	<u>3</u>	<u>45</u>	<u>18</u>
	110	100	270	100

In Ausgram-II Block, where 90 percent of the paddy area is cultivated under rainfed conditions, and even one crop is not assured, 15 acres is considered the minimum necessary to maintain an average family of six persons. Data on the distribution of landholdings in the two villages of Kalihapur and Mongolpur visited show that only two or three percent of all families actually operated holdings in

this size class. Data for the two villages is given below:

KALIKAPUR VILLAGE

<u>Distribution of Landholdings</u>	<u>Number of Families</u>	<u>%</u>	<u>Area (acres)</u>	<u>%</u>
Landless laborers	52	52	—	—
Landless share-croppers	7	7	144	39
1-3 acres	25	25	75	20
3-6 acres	8	8	44	12
6-12 acres	5	5	52	14
12-20 acres	<u>3</u>	<u>3</u>	<u>54</u>	<u>15</u>
	100	100	369	100

MONGOLPUR VILLAGE

<u>Distribution of Landholdings</u>	<u>Number of Families</u>	<u>%</u>	<u>Area (acres)</u>	<u>%</u>
Landless laborers	16	18	—	—
Landless share-croppers	28	31	77	26
1-3 acres	16	18	15	5
3-6 acres	18	20	90	30
6-12 acres	10	11	80	27
12-20 acres	<u>2</u>	<u>2</u>	<u>36</u>	<u>12</u>
	90	100	298	100

The Project Officer and IADP staff support the general interpretation suggested by this data that the overwhelming majority of agriculturist families in Burdwan District are either completely landless or operate uneconomic holdings of usually less than three acres. They estimate that about one-third of all agricultural households are actually pure labor families. Of the two-thirds who are cultivators, approximately fifty percent take some land on crop share; and current estimates are that about fifty percent of the land is cultivated under sharecropping arrangements.

Although the West Bengal Land Reforms Act provides that the sharecropper or bargardar who supplies his own bullocks, and other inputs, should receive 60 percent of the total produce, this provision appears to be universally ignored. In practise, there are a variety of arrangements governing the terms of crop-sharing. In some cases, the annual rent is set in fixed terms, i.e., regardless of output, at about 15 maunds\* of paddy per acre. In a very good year, the bargardar may realize some 35 maunds of paddy per acre; his rental will therefore absorb only some 45 percent of the produce. Yet, in the more likely event of a smaller crop, e.g., 30 maunds, it will rise above 52 percent. Moreover, all the costs of cultivation, including water cess, are borne by the tenant. Under proportional sharecropping arrangements, when the bargardar supplies his own bullocks and inputs, the division of the crop between the landowner and the cultivator is usually fixed in a ratio of 50:50. However, in the poorest, unirrigated areas of the District, the bargardar frequently does not own any bullocks, and he is also dependent on the landlord for inputs. In such cases, the rental is normally fixed at a proportional rate of 66:34 in favor of the landlord. In practice, however, the sharecropper commonly receives much less of the crop than this formal arrangement implies. Throughout the year, the bargardar is dependent on advances from the landlord for payments to laborers—which are not met by landowners—and for consumption loans, for food, clothes, medicine or other family emergencies. At the end of the crop season, these advances are deducted from the sharecropper's one-third of the produce as the first charge on the crop. After allowing for such deductions, it is not unusual for sharecroppers to be left with 12 percent to 15 percent of the total output, about 4 or 5 maunds per acre. One sharecropper interviewed reported that he had received no paddy at all during the previous year, after "adjustments" for all loans had been made against his crop-share. Such cultivators survive mainly by taking even larger loans—falling into a state of perpetual indebtedness—and taking up some additional employment, when it is available, as farm laborers or construction workers. A few have been able to double crop a fragment of their holding with wheat or vegetables and add to their consumption. Some have managed to earn a little cash by putting a fraction of an acre under sugarcane.

The sharecropping system as it is practised in Burdwan District is particularly unfavorable for investment in improved practises. Most landowners are not interested in sharing the cost of modern inputs. Many landlords are actually absentees, living in other villages or in Calcutta; they have other occupations and consider their income from rent simply as supplemental earnings. Moreover, many landowners are themselves not wealthy men. They may belong to the lower middle or middle class; or even be factory workers who hope sometime to come back to the land. It is common to hear of landlords with five and ten acre holdings who have leased out small plots of two and three acres on crop-share.

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\* One maund is equal to 82 pounds.

If the landowner lacks the ability or interest to invest in modern inputs, the sharecropper plainly finds it impossible to do so. In fact, over the last five years, sharecroppers report that their economic situation has considerably deteriorated. Partly, this is the result of the political climate created by the United Front Government's rhetorical commitment to land reform. Many landowners are now afraid that leased out land will ultimately vest in the sharecroppers. They not only refuse to have the names of sharecroppers entered in village records, (as presumptive evidence of possession), and change sharecroppers every other year, but recently, they have also resorted to forcible eviction in order to take up direct cultivation or cultivation through hired labor. As a result, many sharecroppers are now cultivating smaller holdings than in previous years; and in extreme cases, they have been reduced entirely to work as agricultural laborers. Even those who have managed to retain roughly the same size of holding report deterioration in their economic position with the rise in prices of essential commodities. Almost none of the sharecroppers interviewed were currently members of primary agricultural credit cooperatives; a few had been, but then defaulted on loans. Landlords and local businessmen, charging rates of interest of up to 36 percent per year were their main source of production credit. As a result, sharecroppers rarely used any chemical fertilizers, or only small doses. They reported no increase in crop yields with local varieties over the last five years. None had tried the high-yielding varieties, even though some parts of their holdings were topographically suitable, because of the high production costs involved. As subsistence farmers, they had no surplus to sell, and could not benefit from rising prices for foodgrains. On the contrary, confronted by higher prices for essential consumer items, and in many cases, with expanding families to support, they experienced a definite deterioration in all aspects of their economic life.

Yet, the circumstances of farmers with ownership holdings of less than three acres were only moderately better than those of sharecroppers. Generally, they have achieved some increase in yields, of about 25 percent to 30 percent over the last five years, from the use of small doses of chemical fertilizer. But at most, this has permitted them to maintain their present standard of living in the face of rising prices. They report no improvements: and virtually no adoption of the high-yielding varieties citing high production costs.

## II

The vast majority of agriculturists in Burdwan District, i.e., sharecroppers and small farmers with holdings of less than three acres, have received very little help from the cooperatives. The Burdwan Cooperative Bank, which serves four out of six subdivisions of Burdwan District, covers 37 percent of the agricultural population. It includes 750 primary agricultural credit societies, each serving an average of three or four villages. 200 of these societies are actually defunct, and the Central Bank extends credit to 500 societies only. 1/

Until two years ago, credit was extended to members only on the basis of land offered as security for loans. In 1966-67, with the Reserve Bank's insistence on a production oriented crop-loan system, lending procedures were formally amended to give some appearance of conformity to the Reserve Bank's directives; in practice, however, most loans are still sanctioned only against land as security.

Nevertheless, each year, just before the rabi season in November or December, there is a field workers conference to set down scales of finance per acre based on the production costs of each major crop, using both traditional and improved methods. As a result, the Cooperative Bank now has no less than four different scales of finance for the cultivation of paddy alone. Farmers using traditional methods in non-irrigated areas may receive Rs 200 per acre, of which Rs 150 is given in cash, and the remainder in fertilizers and pesticides — although cultivators are not compelled to lift the kind component as a condition of receiving the cash part of the loan. On irrigated land, the scale of finance is higher, amounting to Rs 300, of which Rs 200 is given in cash and Rs 70 in kind. In this case, cultivators are required to lift the kind component of the loan, as a condition of receiving the cash portion, but they are also eligible for an additional loan of Rs 30 to meet expenditures arising out of the application of fertilizers. There are also two scales of finance for the high-yielding varieties of paddy. Cultivators growing NC 678 are eligible to receive Rs 350 per acre, of which Rs 200 is in cash; Rs 100 in kind (compulsory) and an additional Rs 50 in cash (optional). For I.R. 8, the scale is higher: the total loan is Rs 450 per acre, of which Rs 200 is extended in cash; Rs 175 in kind (compulsory) and Rs 75 in cash (optional).

Despite these very elaborate formulas, however, Bank officials freely concede that small farmers do not ask for the maximum credit limits provided; and that the amount actually sanctioned as production

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1/ Figures supplied by the Secretary of the Burdwan Central Cooperative Bank.

loan for any member is in any case determined according to the value of land offered as security. The only exception to this rule is that all members, including sharecroppers, can receive personal surety loans up to Rs 200 per year on the guarantee of two members of the primary agricultural credit society, both of whom are landowners. But for loans in excess of Rs 200 the Central Bank requires members to execute a land mortgage deed in favor of the primary society. This requirement has generally inhibited small farmers from joining the cooperatives: in case of default, they are afraid of losing their lands.

Despite (or because of) these restrictions, the Burdwan Central Cooperative Bank is in an extremely weak financial position. Owned funds, the bulk of which come from contributions to share capital by member societies, have remained stagnant at about Rs 30 - Rs 31 lakhs for the last three years. A very high incidence of overdues has normally placed the Bank in C Audit Class, which restricts its capacity to borrow from the Reserve Bank to only 2 times its owned funds. In 1967-68, however, overdues jumped to 58 percent of all loans outstanding; and the Central Bank could not even meet the Reserve Bank's minimum requirement of a 50 percent nonoverdue cover to qualify for further loan. Nevertheless, in as much as Burdwan is an I.A.D.P. District, the Reserve Bank waived this requirement, and actually agreed to sanction loans amounting to 3 times the owned funds of the Bank i.e., Rs 90 lakhs; a similar accommodation was also extended in 1968-69. Together with deposits, which have shown a modest increase from about Rs 136 lakhs to Rs 144 lakhs over the last three years, these loans helped raise the Bank's working capital to some Rs 241-49 lakhs. Yet, the Reserve Bank's generosity has gone wasted. In practice, the Cooperative Bank has been able to utilize only some 50 percent to 60 percent of the loans sanctioned. Because of heavy defaults at the village level, the total volume of short-term credit advanced over the last three years has declined from about Rs 106 lakhs to Rs 84 lakhs. <sup>1/</sup> The Bank's records on medium-term loans is little better. Over the last three years, advances have remained static at about Rs 5.5 lakhs, with the overwhelming majority of loans sanctioned for the purchase of buffalos and bullocks.

Against this background, it is clear that the bulk of the credit needs of the majority of cultivators continue to be met by local money lenders: either village mahajans, charging an average of 36 percent interest per year; or by cold storage merchants who advance credit against the delivery of the potato and jute crops. The State Government is now thinking that three to five year loans should be given to privately indebted persons to enable them to liquidate outstanding loans and join the local cooperatives. But unless this class as a whole can find some subsidiary sources of income that **permit** them to repay loans from cooperatives in time, it is doubtful that even such a program could permanently increase the repayment capacity of the majority of agriculturists.

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<sup>1/</sup> Written statement provided by the Secretary of the Burdwan Central Cooperative Bank.

## III

It is only when one comes to the upper one-fourth of one-third of rural families, and these in the irrigated areas of the District, than any signs of tangible improvement appear. Farmers with three to six irrigated acres report some increase in yields ranging from 40 percent to 60 percent, as the result of higher applications of fertilizers and pesticides. Although production costs have also increased, this class has also benefitted somewhat from rising prices for paddy. Overall, they have experienced marginal additions to net income that have been used to improve consumption. There is greater expenditure on clothing; on education for sons; and occasionally, purchase of consumer durables, such as a transistor or cycle. In addition, some farmers have used the **opportunity** provided by higher yields of paddy to diversify their cropping pattern and provide a more varied diet for home consumption, including wheat, potatoes or vegetables. A few farmers have enjoyed more substantial improvement: some report the introduction of intensive cropping either as a result of additional water becoming available under the DVC system; or the acquisition of a hand tubewell with the help of Government subsidy. For example, one particularly fortunate three acre cultivator was able to take two paddy crops, **aman and boro**, on one acre over the last two years as a result of additional water supplied by the DVC; and he was also able to introduce a second potato crop on one acre of aus land by installing a hand tubewell purchased under the government subsidy program. His additional income was being used not only to improve consumption, i.e., for better housing; a private drinking water tap; transistor and education; but also for further investment in modern inputs, including a mold-board plough and seed drill.

This is, however, still a rare case. Generally, it is only among the small minority of cultivators with ownership holdings of six acres or more that such gains are found. Farmers with eight or ten acres have increased their yields from ordinary Aman varieties by 30 percent to 60 percent over the past five years. On that portion of their output that is marketed, rising prices have increased their cash income by as much as five or six times per acre of paddy. Most important, they have increased their net returns to management from the introduction of intensive cropping, at least on a portion of their holding. Sinking tubewells with the help of Government subsidy, some farmers have managed to bring one or two acres under double or triple cropping, taking an aus and potato crop; and/or an early Aman and boro paddy crop; and/or jute, early Aman and wheat, increasing their gains still further by the introduction of high-yielding wheat varieties, and I.R. 8 on suitable areas under Aman and during the boro season. Much of the additional income thus generated goes for consumption: clothing; childrens' education; electrification; private drinking taps; watches; transistors; and cycles. But at least a few cultivators among this size class are also able to

accumulate some surplus for further investment in land improvement, including shallow tubewells, and some improved implements.

However, the greatest gains by far have come to resident farmers in the largest size category; i.e., those with holdings between 12 and 20 acres. It is among this class of cultivators that privately owned minor irrigation works are most common, either shallow tubewells or tanks and pumpsets for lift irrigation. Improved implements -- moldboard ploughs, seed drills and sprayers -- are also much more in evidence. Over the last five years or so, they have increased their yields from local varieties by 30 percent to 60 percent; and their cash income per acre by five to six times. With supplementary water facilities, they have put a larger proportion of their holding under double and triple cropping. Those having land suitable for the cultivation of I.R. 8 are introducing it during the Aman season; they expect to double their yields and almost double their net profit per acre on these portions of their holding. Additional income among this group also tends to be spent on consumption; home improvement; consumer durables; and education. But, in addition, large farmers are using their profits to carry out further land improvements; purchase improved implements; and initiate new enterprises, e.g., fisheries; dairies; grocery shops; and even rice husking mills.

#### IV

One-third of all rural families in Burdwan District are agricultural laborers. Permanent relationships between landowners and laborers still persist; they are particularly common in parts of the district dominated by larger holdings. In fact, with the introduction of intensive cropping, the necessity of having assured labor at peak cultivation periods has actually tended to strengthen the system of permanent landowner-laborer relations.

There are two major categories of permanent laborer -- Mahinder and Nagare -- with local variations based on custom. The Mahinders are employed according to a traditional arrangement by which agricultural labor families are permanently attached to the family of a landowner, usually from one generation to the next. Mahinders are employed by larger landowners at the rate of one man for each plough unit, and are on permanent call by the employer, e.g., a Mahinder may be requested to come in the night with no additional payment. Although the exact terms vary in different parts of the District, Mahinders receive payments both in cash and kind. Those interviewed reported cash payments ranging from Rs 110 to Rs 150 annually; and varying amounts of paddy, averaging six to seven maunds a year. In addition, they ordinarily receive two or three meals a day of rice or pudding,

and during the year, three or four dhotis, two towels, one shirt, one woolen wrapper, oil, bidi, and paddy straw for thatching their houses. These are customary terms, and have not varied over the past few years, the single improvement being that the market value of rice has subsequently appreciated. However, with static cash earnings, and rising prices for essential commodities, Mahinders generally report a deterioration in their economic situation over the last few years.

Nagares, the second category of permanent laborer in Burdwan District, also have a customary relationship with only one landowner, but the obligations on both sides are more limited. Nagares will not work for any other landowner; and if a Nagare appears for work, the landowner must give him first preference. But Nagares are paid according to the task performed at rates set down for casual labor, except that they also receive a lump payment of paddy of some 10 to 12 maunds a year. Except for loans they do not get any other facility from the landowner. At the same time, the Nagares are not on permanent call.

Rates for casual labor -- including work done by Nagares -- are essentially determined by supply and demand conditions in Burdwan District. In turn, these are controlled by the annual migration into Burdwan of laborers from the western districts of West Bengal and the eastern districts of Bihar. After the migratory workers arrive, just before the peak season begins in July, the laborers meet with the landowners and bargain over the season's rate, citing rises in prices to justify an increase in wages. Nevertheless, with an abundant supply of migratory workers, local laborers are not in a good bargaining position, and there has been little change in wage rates over the last few years. During the peak season, lasting three months, Nagares receive Rs. 1.50 to Rs. 2 in cash, plus 1.25 kg. of rice, oil, and bidi, equivalent to about Rs. 3.50 or Rs. 4. In addition, migratory workers also get pulses, spices, oil, salt, vegetables, fuel, bidi and kerosene -- but no advances against their wages from the landowners. Off-season rates go down to Rs. 1 or Rs. 1.25 plus 1.25 kg. of rice and oil and bidi. Altogether, Nagares and casual laborers report that they find work for six to seven months a year from all sources -- agricultural work, as well as construction and other odd jobs in the slack season. This represents an improvement over previous years, when with less intensive cropping work was available only about four months a year. Nevertheless, any additions to cash income generated by new opportunities for employment tend to be cancelled out by rising costs of essential commodities. Apart from some minimal improvement in clothing, Nagares, especially those with growing families, report either no improvement or a deterioration in their economic condition over the last few years. However, they are so dependent on "good relations" with the larger landowners for assurance of even this minimal subsistence level -- as long as laborers are easily imported from outside -- that efforts to organize the agricultural workers in Burdwan have so far largely failed.

## V

After reviewing the agro-economic situation in Burdwan District it is indeed difficult to contradict the argument of the United Front Government that the High Yielding Varieties Program is a "rich man's program". While the State Government has undoubtedly made sincere and constructive efforts to help small owner-cultivators, by initiating the large scale program for shallow tubewells under which two-acre farmers are eligible for easy payment loans, the basic tenurial situation is so unfavorable that even this initiative cannot materially help the majority of agriculturists who are completely landless or operate tiny holdings under iniquitous and increasingly precarious sharecropping arrangements. In fact, on these grounds the State Government has given only passive support to the propagation of the new technology; instead, the major political parties in the United Front, i.e., the CPI(M) and the CPI have been more actively interested in the political gains that come from exploiting the social discontents arising from increasing economic disparities. In West Bengal, leftist agitation has so far been most successful among the sharecroppers, the largest single class of cultivators and also the group that has experienced the greatest absolute deterioration in their economic position, with the bleak prospect of even further deprivation if the present trend toward eviction goes unchecked.

Prior to the 1967 elections, the Marxists' basic appeal to sharecroppers and landless laborers was the promise of redistribution of land. Burdwan was one of the Districts that elected 90 percent of its MLA's on the Marxist ticket. Since the elections, the Marxists have followed up their political victory by attempts to organize the sharecroppers and landless laborers. Their major effort is concentrated on establishing Krishak Samitis at the village level, composed mainly of sharecroppers and landless laborers. In Burdwan, the immediate program of the Krishak Samitis is reformist; i.e., to achieve higher wages for agricultural laborers, and a 50:50 division of the crop between landlords and sharecroppers, with landowners paying one half of all production costs.

As in Kerala, however, developments in other parts of the State indicate the likelihood of a sharper confrontation between landlords, laborers and sharecroppers. Like their counterparts in Kerala, the Marxists appear convinced that the only hope of significant change is a fundamental transformation of the existing economic and political system. Their major aim is to keep people aroused and agitated -- not to increase production. Over the last two years, leftist party workers have been appealing to sharecroppers with simple but effective

propaganda, arguing in essence that 'you have been working the land for such long years, your families have been working it for generations, yet the man who does not even recognize which part of the land is his, is getting all the profits and you remain oppressed'. The implication of such arguments is clear -- the land belongs to the tiller. The difficulty confronting the CPI(M) and the CPI in trying to maintain their popular support on the basis of such slogans is how to carry out their promises without unleashing such strong forces of social disorder that even they may ultimately lose control over the outcome.

At the same time, the United Front Government is legitimately stymied by the difficulties of carrying out legal land reforms. In many instances, the Government has not even been able to take over above ceiling land vested in the State due to court injunctions. Other land which should have vested in the State under the ceiling provisions, has been placed permanently out of reach by mala fide transfers. Accordingly, the leftist parties are now convinced that legal remedies available to the State for gaining control over vested land or land that should have vested in Government are useless. They, therefore, conclude that while it is illegal for landless workers to take forcible possession of such lands, it is not immoral. Undoubtedly, this attitude has contributed to the seizure of some 30,000 to 35,000 acres of land over the last few months <sup>1/</sup> by laborers who have long known which land in the village was being retained under mala fide transfers or through use of court injunctions.

However, spectacular these incidents have been, the total area of land ultimately involved, i.e., land that has vested, or should have vested in Government under ceiling laws, except for mala fide transfers, amounts to only 4 percent to 5 percent of the total cultivated area. Actually, even if all such land were vested in landless laborers through seizures or other illegal means, the net effect would still amount to little more than a symbolic gesture towards a solution to the land problem facing West Bengal. In fact, at present, the major political issue in the State concerns the future of the sharecroppers. As long as landlords refuse to have the names of sharecroppers entered in village records, there is no legal protection available to them as the actual cultivators of the land. Inevitably, radical elements who want to strengthen their popular support have begun encouraging sharecroppers to withhold the owners portion of the crop; and/or to refuse to divide the crop on the landowners threshing floor. Violent confrontations between landowners and sharecroppers have already occurred in several parts of West Bengal. <sup>2/</sup> On balance,

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<sup>1/</sup> Estimate provided by the Land and Land Revenue Department, Government of West Bengal, Calcutta

<sup>2/</sup> See the Statesman, July 29, 1969, for a report of one of the latest serious instances.

the impression in the field is that sharecroppers have suffered most as a result of these tactics, with landowners becoming more determined than ever to use forcible means of eviction in order to protect their property rights. In the process, the sharecroppers are becoming more embittered and radicalized; and probably more convinced than ever of the Marxists' political propaganda that fundamental social change can only be accomplished by the complete overturn of the existing property system. In any case, whether or not the Marxists' are sincere in advancing these arguments, it seems inevitable that in order to maintain their popular support, they will be increasingly forced into a direct attack on the propertied classes -- if for no other reason than the recalcitrance of landowners to obey the existing legally enacted, land reform laws.

## CONCLUSIONS

It is always dubious to make broad generalizations about economic and social variables on the basis of a few, selected District studies. It is all the more risky with respect to India, where conditions differ not only from District to District but Block to Block and even village to village. Nevertheless, the case studies presented here gain some credibility as a mirror of emerging relationships between agricultural modernization and social change from the strong resemblances they reflect of the impact of modern technology on rural income distribution and socio-economic relations over widely separated parts of the country.

At least the following points seem clear. As a result of the IADP approach, almost all classes of cultivators have experienced some improvement in income and yields from the introduction of modern methods of agriculture. This is particularly true in the wheat-growing regions where the cultivation of fertilizer-responsive dwarf varieties has been almost universally recognized as more profitable than the traditional techniques. In the rice-growing areas, the spread of the high-yielding varieties is still rather limited because of unfavorable agro-climatic conditions. Nevertheless, even in the rice areas, the introduction of fertilizers, pesticides and other modern practises has produced a steady, if modest, increase in yields of local varieties over the last five years.

The second major point, which also appears certain, is that the gains of the new technology have been very unevenly distributed. In Ludhiana, where the majority of cultivators have economic holdings of 15 or 20 acres or more, and have accumulated surpluses from savings, or through bans, for capital investment in minor irrigation and improved equipment, the benefits of the new technology have been most widely, albeit still unevenly, shared. Probably only the bottom twenty percent of all farmers, i. e., those with holdings of ten acres or less, have experienced a serious relative deterioration in their economic position for want of sufficient capital to invest in indivisible inputs, (especially minor irrigation works), necessary for the profitable adoption of the new techniques. Yet, Ludhiana is a typical even for the Punjab, and much more so far large parts of the wheat growing belt. For example, in Bihar and Uttar Pradesh, both major wheat growing areas, over 80 percent of all cultivating households operate farms of less than eight acres. It is therefore not unreasonable to assume that

the relative percentages of cultivators who have received significant benefits from the new technology compared to those who have been left out are almost exactly the reverse in these areas than in Ludhiana.

Certainly, this has so far been the case in the rice-growing region. There, the overwhelming majority of cultivators have uneconomic holdings of two and three acres. Such farmers have managed to increase per acre yields from the application of small doses of fertilizer, but aggregate gains in output have been insufficient to create capital surpluses for investment in land development; at best, they have permitted small farmers to stabilize their standard of living in the face of rising costs. In cases where small farmers also take part of their holdings on lease, or are pure tenants, rising rentals in recent years (in response to the sharp spurt in land values), and/or the tendency of landowners to resume land for personal cultivation (with the introduction of more profitable techniques), has actually lead to an absolute deterioration in the economic condition of the small owner-cum-tenant cultivator class.

Farmers with ownership holdings between five and ten acres have done better: they have experienced some improvement in net income that has permitted them to realize an overall increase in their standard of consumption. But it appears that only the small minority of cultivators with holdings of ten acres or more have been in a position to mobilize surplus capital for investment in land development, especially minor irrigation, as an essential precondition for the efficient utilization of modern inputs. Moreover, this class has pyramided its gains by using increased profits to buy more land, improve land already under cultivation, and purchase modern equipment. Farmers with twenty acres or more have made the greatest absolute and relative gains, partly by mechanizing farm operations to take up double or multiple cropping, but also by diversifying their cropping pattern to include more profitable commercial crops. All of these innovations together -- installation of private tubewells and other minor irrigation works, the introduction of double and triple cropping, the cultivation of more profitable commercial crops, the purchase of more land, and the use of agricultural machinery to enhance farm efficiency -- have substantially increased the lead of large farmers over small farmers, if not in terms of yields per acre, than certainly with respect to aggregate production. The majority of farmers -- probably as many as 75 percent to 80 percent in the rice belt -- have experienced a relative decline in their economic position; and some proportion, representing unprotected tenants cultivating under oral lease, have suffered an absolute deterioration in their living standard.

The High Yielding Varieties Program is therefore being introduced into a setting where economic disparities have already been substantially sharpened by the differential capacity of small and large farmers, and tenants and landowners, to sustain the capital outlays on land development, especially minor irrigation, and other modern equipment that are necessary to realize the full benefits of the new technology. Given the much higher cultivation costs of the new varieties, and an even greater premium on timely agricultural operations -- including a rigid schedule for the application of fixed amounts of water to achieve maximum potential yields -- the economic disparities between the minority of cultivators who can finance land improvements, and the majority who cannot, is bound to widen further. In fact, in areas where the high-yielding varieties of rice have been successfully introduced, this tendency toward economic polarization between large farmers on the one hand, and the majority of small owners, owner-cum-tenant cultivators and sharecroppers on the other, has already begun.

There has, of course been increasing recognition on the part of Government that "the small farmers have not benefitted in proportion either to their numbers or their needs from the various programs of rural development which have been under implementation during the three Plans." <sup>1/</sup> There is even a commitment in the Draft of the Fourth Plan to ensure that small farmers are enabled to "participate in development and share its benefits." <sup>2/</sup> The difficulty is that the main programs under consideration are likely to fall very much short of the requirement. For example, the Small Farmer Development Agency envisaged for the Fourth Plan is expected to reach a maximum of 1,500,000 farmers in 30 Districts within the next five years; and this Agency will be concerned with expediting arrangements for credit, irrigation, inputs and technical advice only for farmers whose business, including subsidiary activities, is "potentially viable and can be rendered so" through supply of these facilities. The only other program mentioned in the Fourth Plan is an allocation by the States of some Rs. 250 crores for community tanks, tubewells and river pumping projects from which small farmers particularly are supposed to benefit.

<sup>1/</sup> All India Rural Credit Survey Review Committee, Chapter 18, "Credit Facilities for Small Farmers", mimeo.

<sup>2/</sup> Fourth Five Year Plan, Draft, 115.

While such programs certainly represent measures aimed in the right direction and deserve maximum support from State and local development administrations, the scale on which they are being mounted suggests that the "small farmer" is still being treated as if he belonged to a residual or marginal category. Unfortunately, the opposite is true: once all the disabilities of the average cultivator are taken into account (and these only in the irrigated areas of the country), the majority of agriculturists actually fall into the "small farmer" category, in the sense of lacking both the means and the incentives to participate in the new technology. Often, the obstacles they face are cumulative. Among them are the small size of the ownership holding itself which cannot generate a surplus, the heavy reliance on leased-in land to make up an economic unit of operations, on increasingly onerous rental terms, the inability to qualify for land development loans in order to finance minor irrigation and other land improvement schemes, the incapacity to make economic use of higher credit limits under the cooperatives' crop loan system in the absence of assured water which alone can protect greater investment outlays on modern inputs from losses caused by crop failure in bad weather years; the slow rate at which yields increase when less than the optimum package of modern inputs is applied, and the marginal increases in net income as a result of all these factors which keep the average cultivator always behind the starting line with respect to agricultural modernization.

At present, it is virtually impossible to say how many of the majority of uneconomic farmers could be made potentially viable. What is almost certain, however, is that the major programs now being advanced will reach only a small fraction of the total. For one thing, they virtually ignore the tenurial situation in most parts of the rice belt (and for that matter in part of the wheat area, for example, Bihar), where a very large proportion of cultivators operate holdings under oral lease with no legal recourse against eviction, and on such terms that they are often left with a net deficit at the end of the year, not to speak of surpluses for investment. Second, unless the central government is prepared to help the States finance a much more massive development program in minor and medium irrigation designed specifically to help the small farmer, it is doubtful that more than a handful will be able to find significant benefit from the adoption of the high-yielding varieties. In fact, unless such a massive effort is made the small farmers will continue of their own choice to ignore new

opportunities to obtain larger production loans from the cooperatives for the cultivation of high-yielding varieties, out of fear that crop failures in bad weather years will involve them in such heavy losses that they may have to sell their land in order to repay outstanding debts.

There is another serious -- perhaps more serious -- limitation to programs such as the Small Farmers Development Agency as an instrument for helping all classes of agriculturists to participate in the benefits of the new technology. This is the policy decision to exclude sub-marginal farmers -- many of whom are sharecroppers -- and agricultural laborers from the scope of its operations. While this may be considered sensible from an economic point of view, i. e., from the perspective of achieving maximum gains in production, it may prove very shortsighted with respect to realizing social and political goals of orderly progress through democratic means. Indeed, while the small farmers are apt to experience the greatest relative decline in economic position as a result of agricultural modernization, they are also likely to remain a conservative force: small farmers still respect traditional criteria of status and tend to identify with the larger landowners. But this is less true of sharecroppers and landless laborers who have been increasingly liberated from the old authority patterns by the erosion of customary relationship.

The IADP and now the High Yielding Varieties Program have not only intensified the process of economic polarization in the rural areas, but they have also contributed to an increasing social estrangement between landlords and tenants and landowners and laborers. In all areas, the introduction of modern methods of production has accelerated the transformation of the rural economy from a subsistence way of life to profitable set of business activities. Landowners are now more likely to be influenced by rough calculations of opportunity costs in determining whether or not lease out part of their land, or cultivate directly, than by traditional feelings of personal obligations to customary tenants. Certainly, they do not hesitate to raise rentals in line with appreciating land values; and/or to evict even tenants having long-standing cultivating possession of the land. Moreover, the land reforms laws in all States, while largely abortive, have caused landowners to view tenants at least as potential adversaries, and this has further contributed to the breakdown of customary ties. Obviously, tenants who are shifted from plot to plot, and cultivate always in fear of eviction of losing some part of their holding to the landlord or another tenant, also quickly slough off traditional feelings of deference and obligation toward the landlord.

The same pattern of erosion in traditional attitudes of interdependence is also apparent in relations between landowners and laborers. The impact of the IADP, and the High Yielding Varieties Program on landless laborers usually looks favorable at first glance. With more intensive cropping and diversification of the cropping pattern, laborers tend to find more work; moreover, during the past few years, the level of cash wages has also increased. Nevertheless, in the face of rising prices, laborers are generally left with little improvement in real income, and in some cases, they actually report some deterioration over previous years. Their main hope of sharing equally in the benefits of the new technology is to maintain the traditional system of proportional payments in kind for major agricultural operations, especially harvesting. Yet, landowners, calculating that their own economic interests lie in converting all kind payments to cash, are denouncing the traditional system as exploitative, and moving to introduce a cash wage for all kinds of farm work. Where mechanization is feasible, large farmers are anxious to buy machinery as quickly as possible to reduce their dependence on labor. Once again, there is not only growing economic polarization, but social estrangement between landowners and laborers as well. With contractual relationships increasingly replacing customary arrangements in the recruitment of farm labor, and impersonal bargaining sessions becoming the rule between landowners and workers, old ideas of interdependence are increasingly being replaced by new notions on opposing economic or class interests.

On the whole, therefore, it is probably not too much to say that the IADP approach and the High Yielding Varieties Program have not only contributed to increasing economic disparities in rural areas, but also to atmosphere of social polarization. By strengthening economic motivations as the main impetus to social action, the new technology has eroded traditional notions of interdependence among landlords and tenants, and landowners and laborers, and further weakened the foundation stone of social stability in rural areas. The situation is potentially all the more serious because leftist parties openly proclaim their intention of transforming these tendencies toward economic and social polarization into open political confrontations between the minority of prosperous landowners, and the great majority of sharecroppers and landless laborers.

It is unfortunate for India, but nevertheless true, that the greatest technological possibilities for increasing production should have come about precisely at a time when traditional solidarity structures are badly weakened; when social resentment about increasing disparities is at a new height; and when leftist political parties are increasingly active

(and successful) in mobilizing social discontent for radical goal. In a number of areas, especially in the rice belt, it can be anticipated that the dual objectives of increasing agricultural production and maintaining social stability will be incompatible unless a fundamental change occurs in the outlook of the propertied classes -- if on no other grounds than that of enlightened self-interest -- so that the Government of the day can at least ameliorate if not remove some of the most distressing inequalities that have so far accompanied the progress of agricultural modernization. Without, at least, some sign of good faith on the part of the Government, it cannot be expected that the mass of agriculturists and laborers will continue to passively accept their fate, or that the Government can continue to take for granted the fundamental requirement of any process of economic growth, i. e., the perpetuation of conditions of "law and order" in the rural areas. The situation now developing in parts of the Indian countryside testifies to the basic wisdom of India's planners in giving social goals of greater equality co-equal importance with economic objectives of increasing production in the original agricultural development strategy.