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An approach to Study of Traditional Farming Systems  
in the Semi-Arid Tropical Regions of India

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STATEMENT OF THE PROBLEMS:

Low and unstable crop production is the basic problem of agriculture in the semi-arid tropics. The problem stems largely from: (a) inherent deficiencies of natural resource base (such as the low and erratic rainfall), and (b) inefficient or ineffective utilization of the same. While the elimination of (a) lies well beyond the purview of ICRISAT, (b) constitutes the core of the problem to which the Institute has to address itself. The broad approach this problem needs could be described as a two-way adaptation process: (i) adapting the environment (including the spatial and temporal distribution or precipitation through human intervention in the form of harvesting and re-use of water) to the production activities, and (ii) adapting the production activities (e.g. crop species) to the not-so-hospitable environment for higher and stable production. The limits to which adaptation process could be extended would indicate the physical production potential of SAT agriculture. The first step towards harnessing the said potential would be the identification of operatable ingredients

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of the adaptation process. The same could be traced: (1) in the theories of applied agricultural sciences, which constitute the basis of scientific farming system being evolved at ICRISAT and (2) in the traditional wisdom of the farmer, which is embodied in the prevailing system of farming in the semi-arid areas. The ingredients belonging to the second source assume added significance because if properly understood they can help in:

- i) Tracing the scientific basis of traditional agriculture,
- ii) Identification of non-technical limits of technically feasible ingredients emanating from applied farm sciences.
- iii) Identification of formal and informal institutional arrangements evolved in the past to supplement the "technical" solutions to the problems faced by the SAT farmer.
- iv) (i) to (iii) in turn may help in identifying the components of prevailing farming systems which need (or could be) replaced, retained or improved or made more productive through modern technology.

Identification of relevant ingredients (of both technical and institutional nature) of traditional farming systems presupposes a thorough understanding of the latter. To facilitate the said understanding study of traditional farming systems in the selected regions of India to start with is proposed.

The central purpose of the study, to reiterate, is to understand the existing systems of farming in the SAT areas so as to be able to communicate to the scientists the areas of activities where their results could readily fit, the areas where their approaches may prove inconsistent with the realities of farming situations, the

areas upon which they may profitably concentrate for more relevant (i.e. high pay-off readily acceptable), technology and the areas where variety of preconditions will have to be satisfied before new technology could effectively perform. The purpose of the study could be spelled out in terms of broad objectives as well.

OBJECTIVES OF THE STUDY.

- (1) To identify and examine the working of different components of traditional farming systems.
- (2) To understand the rationale behind the traditional farming systems and evaluate the same with reference to
  - (a) the state of the existing (technical) knowledge at different levels;
  - (b) other objective circumstances of socio-economic and institutional nature.
- (3) To compare the existing farming systems with the proposed watershed-based farming systems of ICRISAT in order to identify gaps between the two and examine the scope of reducing the gaps.
- (4) To clearly spell out the constraints of farming under semi-arid tropical agriculture and identify the areas (of high pay-off research) where ICRISAT research efforts could be concentrated.
- (5) To indicate the areas, falling outside the purview of ICRISAT, where action needs to be initiated if new technology of SAT agriculture is to play its fuller role.

In keeping with the above objectives some specific hypotheses will be framed in order to guide and facilitate the collection of relevant data. The aspects of the traditional farming systems pertaining to which hypotheses would be framed and data collected are:

- Status and use-pattern of farm assets like land, livestock and farm capital (and also labour) and how the same is affected by instability of SAT - agriculture?
- Cropping patterns and the role of factors like risk aversion, subsistence orientation, resource constraints (including time and energy), traditional knowhow etc. in determining the same.
- Economics of intensive monocropping versus multiple-cropping and the role of risk factor, profitability, resource requirements etc. therein.
- Farming practices (including periodic land fallowing, crop rotations, intercropping) and agronomic and economic rationale behind them.
- Utilisation of rainfall and irrigation - tanks, open wells, bunds, tubewells etc.; their economics and management systems.
- Product disposal pattern and marketing behaviour of the SAT-farmer and the role of prices, marketing and storage infrastructure and the farmer's product-retention commitments in determining the same.

- Consumption pattern and its seasonal changes.
- Family composition and employment situation on the farms; wage payment systems, etc.
- Assets, liabilities and income position of the farmer.
- Place of livestock in the farming systems and its role in influencing cropping patterns and other farm strategies.
- Rural institutions (including tenurial conditions and cooperatives etc.) as they affect the resource use pattern at farm as well as village level.
- Existing cooperative structures and their role in promoting group action.
- Adoption of new technology - including HYVs and related inputs as well as dry farming practices and the factors helping or hindering the adoption.

#### ON THE QUESTION OF APPROACH

Adequate understanding of rather complex aspects of traditional farming systems as indicated above would call for studies of general patterns as well area and situation-specific features of SAT farming as witnessed in various parts of India. Accordingly the study would call for three inter-related approaches - micro level study of sample farms in the selected areas, study of specific situations/cases and

depth study of general patterns and tendencies observed in SAT farming. The same may be elaborated:

(a) Detailed micro-level agro-economic studies in selected areas

Here the details about the total economy of the farmer would be collected for a period covering crop seasons. The investigators who will be stationed in selected villages will collect data on the status and use-pattern of farm resources; input-output data of different enterprises; details of consumption, marketing and other economic activities; details of institutional arrangements and other support services etc. The data will be collected through structured schedules but more emphasis (through discussions, observations etc.) will be placed on the root/context of the data, non-quantitative and not easily reportable details. Investigators having rural background and knowledge of local conditions (including the dialect) will be properly trained and given written instructions. They will also be given a set of specific questions which would be central to their discussions and observations. Thus an attempt would be made to combine economic and anthropological approaches to understand different components of the traditional farming systems.

(b) Case studies of specific situations

Since the comprehensive studies at the micro-level would cover the general pattern of the farming systems certain specific situations (e.g. in the form of successful group action for water

harvesting, traditional pattern of tank system, a system of percolation tanks, coexistence of tanks and wells in some areas; a situation having all types of moisture conservation devices at one place etc.) will be covered by specific case studies to supplement the findings of these studies. The main focus of the case studies would be on understanding the specific circumstances responsible for initiation and effective working of the system and possibility of their replication.

(c) Depth studies of specific problems

The studies under this category would be complementary to those under (a) and (b) and would heavily rely on the data and insights provided by them. These studies would be much more comprehensive in scope. They would make use of our own data as well as data from various other sources like different nation-wide surveys, studies by the ICAR and its institutes/projects, Agro-Economic Research Centres, Directorates of Economics and Statistics, Agricultural and other Universities etc. Some of the specific problems to be covered by the said studies are: Risk and uncertainty in SAT farming and farmers' defence mechanism; degree of subsistence orientation and problem of change in SAT farming; marketing and storage problems of SAT-crops; institutional and organisational pre-requisites of watershed-based farming systems, broader growth/development linkage of measures designed for stability in SAT agriculture, employment and income situation in SAT regions etc.

Integration of the results of studies under (a), (b) and (c) categories would greatly enhance our understanding about the traditional farming systems.

OPERATIONAL ASPECTS:

The discussion below relates to some issues of methodology such as the selection of areas of study, samples of farms etc. However, it may be stated that these details relate only to studies under (a), as the field work requirements of (b) and (c) would be adjusted with (a) at different stages of work.

Selection of areas: On the basis of rainfall pattern, soils, cropping patterns and the likely facilities through the on-going dry farming research/development programmes of the ICAR etc. the following districts have been tentatively selected from which the final choice of five districts will be made:

1. Mahboobnagar (Andhra Pradesh)
2. Sholapur (Maharashtra)
3. Akola (Maharashtra)
4. Indore (Madhya Pradesh)
5. Rewa (Madhya Pradesh)
6. Jaipur (Rajasthan)
7. Jhansi (Uttar Pradesh)

(Relevant details about the above districts are presented in Appendix I.)

Villages Selection: From each of the selected districts one or more villages will be selected for the study. We would prefer that the villages to be selected should satisfy the following conditions:

- 1) be of average type in the sense that it has not been favoured by any particular programme in terms of development projects or additional resources from official or non-official agencies or any extra facility normally not available to other villages in the neighbourhood.
- 2) depict the general agricultural situation of the area in terms of soil types, climate, extent and type of irrigation facilities (if any), cropping patterns, livestock and general agricultural practices.
- 3) be of a size (in terms of number of households) which is considered average for the villages in the region.
- 4) be a normal agricultural village having a majority of cultivating families rather than families of landless labourers or non-cultivating people like traders, money-lenders etc.
- 5) be accessible by car in all seasons, but it should be at least 20 miles away from the city so that the influence of the city in terms of employment etc. is negligible.
- 6) have clearly identifiable watersheds.
- 7) as far as possible, not have factions and it should be cooperative enough in terms of supplying information and freely discussing their farming problems.

8) have at least the minimum facilities for accomodation etc. (on payment) for the field investigator who would be permanently stationed in the village for several months.

However the final selection of villages will be made in consultation with Drs. Krantz, Kampen and their associates in the Farming Systems, district agricultural officials and the scientists of dry farming projects in the selected districts. The association with the latter would hopefully be more useful during the subsequent stages of the work, as they possess useful data and experience of field level situation directly relevant to our work.

Watershed based Sampling of farms: For the selected villages detailed census of households will be done. Broad information about resource base, occupational patterns, normal cropping patterns and other socio-economic factors for every household in the village will be collected through the census. For a detailed study of the farming systems a small sample of 30 to 50 farm households will be selected.

As the main thrust of ICRISAT research is on development of a watershed-based technology for SAT agriculture it would be in keeping with the things that studies of traditional farming systems give equally significant importance to watersheds while collecting and analysing farm level data. This hopefully would enhance the relevance and utility of our results as inputs for the scientists engaged in evolving viable technology for SAT agriculture.

In view of the above, the samples of the farmers will be selected on the basis of watersheds. Clear delineation of watersheds and identification of farm holdings thereon, though preconditions for final sampling, are highly technical tasks. This would involve a land survey and mapping of the required details. Block level topographic sheets and cadastral maps available for every village may prove helpful in this respect. Yet for the land survey and mapping, the study would completely depend on the farming systems scientists of ICRISAT. Assistance from soil specialists of districts and dry farming projects may also be requested.

Once the watershed and landholdings therein are identified a sample of farms from within the farms comprising the watershed would be selected on the basis of size of holding and actual location of the farm (on uplands or low lands etc.) within the watershed. This selection again would be made in consultation with the scientists of the Farming Systems at ICRISAT. <sup>1/</sup>

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<sup>1/</sup> Collection of farm-level data on a watershed basis has been recommended quite often. But this has never been tried in any worthwhile study in this country. The task is fraught with a number of difficulties such as those created by spread of fragments of land of the individual farmer in different watersheds etc.

There is a possibility that sampling on a watershed basis may not prove feasible. In this event we will have to revert to the conventional method of sampling taking the village (rather than the watershed) as a unit for selection of households.

Appendix I: Relevant details about the selected districts

District	Soils	Rainfall (mm)	% of cropped area irri- -gated	Important crops	Projects/ institu- tions in the distt.*
1. Mahbub- nagar (A.P.)	Red soils	713	14.5	Sorghum, ground- nut, kharif pulses and castor	3
2. Sholapur (Mahara- shtra)	Black soils	691	10.7	Sorghum, millet, groundnut, pulses	1, 2, 4
3. Akola (Mahara- shtra)	Black soils	817	1.5	Sorghum, cotton groundnut	1, 2, 5
4. Indore (M.P.)	Medium deep black soils	975	3.7	Sorghum cotton, wheat, gram.	2
5. Rewa (M.P.)	Mixed red & black soils	1163	3.5	Paddy, wheat, sorghum, pulses	2, 6
6. Jaipur (Rajas- than)	Alluvial sandy- loam soils	670	17.0	Millet, kharif, pulses, wheat gram, barley	4, 6
7. Jhansi (U.P.)	Red & black soils	879	24.1	Sorghum, kharif pulses, wheat.	2

\* Index of projects/institutions etc.

1. All India Coordinated Research Project for Dryland Agriculture
2. Integrated Dryland Agriculture Development Project
3. Drought prone area development project
4. Agricultural Research Station
5. Agricultural University
6. Agricultural College.