FARM LABOR BY AGE AND SEX IN NORTHWESTERN SYRIA: IMPLICATIONS FOR TWO PROPOSED TECHNOLOGIES

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BACKGROUND AND OBJECTIVES

The International Center for Agricultural Research in the Dry Areas (ICARDA), seeks to make improvements in the principal groups of food commodities, viz., cereals, food legumes, forages, and livestock, as well as the farming systems in which they are dominant. With the introduction of innovations on the farm, other changes are expected to occur. To optimize the beneficial effects of these innovations, scientists in the Farming Systems Program (FSP) conduct studies to assess the impact of new technologies. Biological and social scientists interact and have high sensitivity in considering farmers' needs. Two of the objectives of the research activities in the Food Legume Program in ICARDA are:

1. Selecting lentil cultivars suited to mechanical harvesting.

2. Introducing new varieties of chickpeas which are resistant to ascochyta blight and thus, suitable for early sowing.

Previous research at ICARDA had shown that new mechanical technologies were rather quickly adopted in Syria. For instance, since the first introduction of tractors to Syria in the 1940s, land preparation is now a task almost completely done by tractor. In addition, combine harvesters are becoming increasingly common in both wheat and barley. All the legume crops are hand harvested and ICARDA is currently developing a mechanical harvester for legume crops. It is known that hand harvesting is laborious, time consuming, and costly but, on the other hand, it is an opportunity for those who seek off-farm employment. This source of income may be important for many rural households.

A first attempt was made to examine the constraints faced by the farmers in lentil production through a survey of 115 lentil growers in 52 villages in Syria. The survey was conducted jointly by the Food Legumes Improvement Program and the Farming Systems Program of ICARDA in 1978/79 and 1979/80. Some interesting findings (ICARDA, 1982, and unpublished results) are presented below:

- The main factor limiting yields as seen by the farmers is the weather; almost 90% of farmers find that inadequate and variable rain is a serious constraint. Insufficient fertilizer and weed infestation are also considered constraints. In addition, almost 50% of farmers' lentil plots were affected by orobanche, an endemic parasitic weed of legumes.

- Although labor is expensive, farmers do not seem to have a problem in hiring labor. Almost 80% of farmers did not find problems in hiring labor. It is believed that farmers plan in advance to

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organize the harvest labor since the period for harvesting lentil crops is quite limited.

- Sixty-four percent of farmers reported that they would not drop lentils, knowing that lentil plays an important role in crop rotations. In addition, the straw which is a valuable source of animal feed is an important component of the total revenue in lentil production. In some years, lentil straw is more valuable than the grain.

- Farmers are sensitive to the economics of lentil production: a fall in the price of lentils and a rise in the cost of harvesting would play a role in their decision-making about lentil production. Twenty-six percent of farmers said they would increase their lentil areas if any increase in lentil price occurred.

- Female labor plays an important role in lentil harvesting. Ninety-three percent of the growers used both male and female labor, and in 60% of the cases female labor was dominant. Information on whether the labor input is provided by the household, hired, or both, was not studied in detail.

The second objective mentioned above relates to one of the interesting research results to date at ICARDA. It is the development of new chickpea cultivars that are resistant to cold and to ascochyta blight. The Kabuli chickpea is considered an important food legume in most of the Mediterranean basin due to the beneficial role it plays in rotations and in human diets. Chickpea is usually a spring crop and is planted in March. Farmers plant it late in order to avoid ascochyta blight which is likely to attack a crop sown in December or January. Research has shown that if the disease can be avoided, increased moisture availability to the plants can increase yields tremendously (Keatinge and Cooper, 1982). From intensive research and on-farm testing, it has been demonstrated that a new variety, planted in winter, results in nearly a 100% increase in yield over the local variety (ICARDA, 1982). Spring planting allows late cultivations before sowing to provide relatively good weed control, but this does not occur with winter plantings; thus, in order to achieve these yield responses, two intensive weedings are required. Information is needed to find out: (1) would it be convenient for the household to plant chickpea in wintertime?, (2) would the household be able to mobilize the additional labor for the weeding task?, and (3) by whom would the weeding tasks be carried out?

Since any new technology may create a diversification and/or displacement of labor use, rural development programs should consider the contribution of the principal sources of labor input when new technologies are introduced in rural communities. Hence, the welfare of farm families would be enhanced in a more balanced manner when possible social impacts are examined in any agricultural development.

Based on this need, drawing a picture of the division of labor between men, women, and children in agricultural production is one aspect of this

research, and examining the social impact of the two technologies under development at ICARDA is the second.

Specifically, the objectives are:

1. To determine the tasks of men, women, and children related to various crop production activities.

2. To compare men's versus women's labor input.

3. To predict the potential impact that new technologies will create vis-a-vis labor uses.

METHOD OF THE STUDY

The Study Unit

The study unit in the analysis is the household, defined as the group of people who normally eat and reside together, provide labor on the farm holdings, and share income and resources. The household might include nuclear or extended families. Persons who are away from the main residence on a temporary or partial basis are considered part of the household if they continue to share in the household economy.

Period and Location of the Study

The study investigates farm labor for the production of crops and livestock for the 1982/83 cropping season. Since the new technologies refer to the food legume crops, the sampling locations were selected on the basis of the distribution of chickpea and lentil production areas. In 1980/81, almost 30% of the area planted to these legumes in Syria was in Aleppo Province of northwestern Syria (SAR, 1981). This percentage represented the highest in Syria. Aleppo Province is divided into eight districts. The location of the sample was chosen in the Azaz district (north of Aleppo) for two reasons:

1. In Azaz district two agroclimatic zones (1 and 2) are found.[1] Due to the fact that winter sowing would allow the new cultivar of chickpea to be introduced in lower rainfall zones, it was decided to include villages from zone 2 in the study.

2. Adding up the area planted to lentil and chickpea, 40% of the area devoted to these crops in Aleppo Province is located in Azaz district (Table 1).

SAMPLE SELECTION

The total population of Azaz district is 127,488 (SAR, 1981). Two villages were selected from the Azaz centre sub-district in zone 1 and two other villages were selected in zone 2 from the Aktarine sub-district, from a

total of 34 and 54 villages respectively in the two sub-districts.

The selection of villages was based on a certain representativeness within each zone, under the following criteria:

a. Ratio of the total households to farms is about equal to one in the village, thus there are few landless households;

b. Cropping systems representative of the area;

c. Similarity in soil and climate, and

d. Common ethnic backgrounds.

A list of the households was provided by the head (*mukhtar*) of each selected village. The total number of households in the two selected zone 1 villages is 116 households (41 in Yahmoul village and 75 in Jarez village). The total number of households in the two selected zone 2 villages is 102 (51 in Al-Ghose village and 51 in Al-Barouzeh village).

Twenty-four households were randomly selected to represent each zone (12 in each village). This sample size was regarded as sufficient under the practical assumption that overall variations are not great within each zone in the sampled area (ADC, 1976). Systematic random sampling was used in selecting the sample from the lists of households.

The total sample is 47 households; one household was dropped since it neither owned land nor participated in off-farm agricultural activities. The sample comprises 21% of the total population in the chosen villages.

The villages selected in zone 1, Jarez and Yahmoul, are located 50 to 55 km northwest of Aleppo. The main crops of these two villages are wheat, barley, legumes (including lentil, vetch and chickpea), and summer crops. They receive an average rainfall of between 400 to 500 mm per year. The villages in zone 2, Al-Barouzeh and Al-Ghose, are located 45 to 50 km northeast of Aleppo. The main crops of these two villages are wheat, barley, lentil, vetch, and summer crops. Virtually no chickpeas are being grown by farmers in these villages. These two villages receive an average rainfall of between 300 to 350 mm per year.

DATA COLLECTION

Several steps were taken before starting the formal interview process. First, during the fall season in 1982, informal visits were made to different villages in different agroclimatic zones. General questions were asked concerning division of labor by sex in different tasks for each crop in on-farm and off-farm agricultural activities, other economic activities, and decision-making regarding aspects of farm household life.

Visits were made after selecting the four villages in order (1) to explain the study to the village leader, (2) to get a list of village

households from him, and (3) to find out if the households were willing to cooperate.

A structured questionnaire was prepared and in January 1983, pretest interviews were conducted in two different villages having the same agroclimatic zones (1 and 2) as the villages studied. Finally, the formal survey started. The information was gathered in three rounds, spaced in time over the cropping season, for each household according to the different tasks carried out at each time. Information was collected from both the husband and wife in each household at each interview session.

The first round of interviews started February 16, 1983. About an hour was spent in each household and approximately three households were interviewed each day. The focus of the first interview was:

1. The demographic structure including household composition by age and sex, education, enrollment at school, age at marriage, and work residency.

2. The crops planted in the current season and all the specific tasks already carried out such as the tillage operations, seeding, fertilizing, and rodent control for the winter crops. The following questions were asked for each crop:

   - The amount of land the household allocated to the crop.

   - The specific tasks that have been carried out prior to the interview. For each task and each crop, information was collected on who performed the tasks, disaggregated by sex and age, the methods used, the approximate date of accomplishment (month and week), and duration as total number of days and total number of hours per day. Wage questions also were disaggregated by age and sex.

The second round of interviews began at the end of April. This interview concerned cropping techniques and livestock management. More specifically, the following tasks were examined:

- Planting and fertilizer application for the spring and summer crops;

- Controlling weeds either manually or chemically;

- Using pesticides and controlling rodents, and

- Livestock activities.

The livestock questions comprised: (1) kind of livestock owned; (2) feeding practices; (3) herding practices; (4) processing animal products; (5) marketing; and (6) to whom the receipts from livestock products accrue.

The third and final round of interviews was conducted in late August

after the harvest and all the post-harvest tasks were completed. The questions sought to provide information on the following activities:

- Harvesting;
- Transporting the crop from the fields to the threshing floor;
- Threshing;
- Winnowing;
- Cleaning, and
- Bagging.

Questions on the proportions of income derived from crops, livestock and off-farm agricultural and non-agricultural activities were asked. Because information on total income is difficult to gather, only the proportions of income derived from different sources were determined. The validity of the responses for income were checked against the land owned, number of livestock, number of people working outside, and those working in off-farm agricultural activities.

General questions were also asked concerning the attitudes of husbands and wives toward the proposed new technologies.

THE FINDINGS

Following the analysis of this survey, general conclusions can be drawn which are of importance to both of the new technologies under consideration.

1. Specialization of agricultural tasks by household members, and by hired labor, differs among crops and techniques used in accomplishing the tasks. From Table 2 to Table 5 one can notice that land preparation and chemical weed control are usually done by men. Fertilizer application and seeding are generally male tasks, but spreading manure in the field is normally done by females. Hand weeding and planting summer crops are mostly done by females. Seed preparation and the various steps in the harvest process seem to be shared jointly by male and female labor, although there is also specialization by sex within the harvest process itself.

2. In general, men's and women's contributions to agricultural labor (in terms of hours of physical work, including both family and hired) are almost equally divided. Women's contribution is 50% of the total hours spent in all production whereas it is 43% for men and 7% for children (Table 6).

3. Women provide 62% of all labor for legume crops and 42% for cereal crops, compared to 27% and 54% provided by men. Legume crops

involve more nonmechanized operations in which women's contributions exceed those of men.

4. Hired labor is equally divided by sex in total agricultural production, but . . .

5. The contribution of hired labor, by sex, to agricultural production depends on the degree to which the production is mechanized (Table 6, cereal vs. legume crops).

6. Considering total agricultural production, household labor provides 59% of the total work-hours, while the rest is provided by hired labor. It appears that in the villages surveyed, the shortage of hired labor does not constitute a problem.

7. Fifty-seven percent of the adult (13 years and older) household labor input is provided by women.

8. Household labor, primarily women, plays a major role in the hand weeding task for the legume crops. The household contribution to this task is 81%.

9. Women and children provide 87% of the work-hours while men provide 13% of the total labor input for harvesting legume crops.

10. Two-thirds of the labor input in harvesting legume crops are provided by hired labor. Women and children provide 94% of hired labor.

11. Labor hired from outside the village comes from villages where an average of 40% of total households are landless.

12. On the average, a household owns 16 ha of land and the main source of income comes from crops and livestock (63% of the total income), while 10% and 27% come from agriculture off-farm and non-agricultural activities respectively.

DISCUSSION AND CONCLUSION

It is clearly shown that women play a major role in hand weeding and harvesting in agricultural production. Therefore, changes in labor use in these two particular tasks might have profound and radical effects, since the two technologies discussed earlier are closely linked with labor use in these tasks. First, mechanical harvesting of legumes might halt or reverse the reduction in area planted to legumes as well as decrease the burdens on household labor, but will eliminate a source of employment for women and children and may have a negative effect on the incomes of the poor and landless rural families. The survey shows that diverse male job opportunities are offered in and outside the villages while female job opportunities are restricted to agricultural activities.

Improving the welfare of rural farm families is inseparable from the employment opportunities of rural women. If we assume that mechanization is to increase the welfare of rural farm families and decrease the burden of hand harvesting, alternate opportunities of employment are needed for these women who are likely to be displaced. In addition, agricultural off-farm income among the villages studied is low compared to other sources of income. The question that can be raised here is, whether agricultural off-farm income is important to the rural families in the villages which mainly provide the hired labor. Thus, further survey work which focuses on sources of income for small landholders and landless households is needed to evaluate and measure the income effect of the mechanization of harvesting legume crops.

The second point, which is relevant to the improved variety of chickpeas, relates to the fact that successful introduction of winter sown chickpea will depend on additional weeding. Both husbands and wives were questioned on their willingness to adopt this new practice based on two assumptions: first, that a winter sown crop would double their current yield, but second, it would need an intensive weeding in early spring. According to the results of this interview, in zone 1, 70% of the households, both husbands and wives agreed that they would grow the new variety. Twenty-five percent of them were prepared to pay for the additional hand weeding and thought that this extra cost would be worthwhile. In the remaining households, both husbands and wives indicated that household labor would be used to carry out the weeding. Most of the wives agreed to undertake this extra task if yield increases from winter sowing were as great as suggested. Thirty percent said they would not grow the new variety because of the labor expenses. In these households, family labor could not be provided to carry on this task due to the household composition. Hence, the new variety would only be adopted among those households if herbicides became available.

In zone 2, three groups of answers were found. In the first, 63% of the households stated that they would grow the new variety, but thought that the payment for the intensive weeding might be problematic. These villages are, relatively speaking, less well off than the villages in zone 1, and none of the households were accustomed to paying for weeding since the farmer's wife and daughters usually perform that task. The idea of having a good yield of chickpea interested both the husband and wife. The second group (29% of the households) refused to plant the new variety due to lack of land, and the third group (8% of the households) reported contradictory answers between husband and wife; the husbands refusing while the wives appeared willing to do the extra weeding.

In conclusion, it can be said that earlier planting will increase the weed problems on the chickpea plots, and hand weeding tasks in these plots will weigh most heavily on women in the household. The fact that most weeding is currently done without hiring labor indicates that there is no labor bottleneck at this time of the cropping calendar, but a greater weeding effort may overtax a family's female labor pool. On the other hand, household composition and the family demographic structure might have an effect on cropping choice, hired labor practices, and choice of

technologies. If chemical weed control of chickpeas is introduced, this task will be undertaken by the men and this will radically affect the labor allocation in chickpea production. Whether such a change would be good or bad for rural households depends on: (1) the alternate uses women make of their time, and (2) the importance of weeds in feeding livestock.[2]

I have argued in this paper that the new technologies under development at ICARDA would have an effect on labor use, particularly on women's labor, since the proposed technologies are closely linked with the tasks carried out by them. Further studies are needed in order to determine the cost and the benefit of these changes.

Footnotes.

[1]Syria may be divided into five agricultural zones (SAR, 1983):

1. Zone 1: With annual rainfall between 350 to 600 mm and not less than 300 mm in two-thirds of the years. The main crops are wheat, chickpeas, lentils, and summer crops. Fruit and olive tree growing is important.
2. Zone 2: With annual rainfall rate between 250 to 350 mm and not less than 250 mm in two-thirds of the years. The main crops are wheat, barley, lentils, and summer crops.
3. Zones 3, 4, and 5 are drier and only minimally engaged in legume production.

[2]Another study, titled "Wheat Dominated Systems in Syria," by ICARDA's Farming Systems Program, is currently in progress. Its objectives include an assessment of farmers' fertilizer and weed control practices. It also aims to estimate the proportion and importance of weeds in animal diets.

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Table 1

Total area of lentils and chickpeas in Aleppo Province, 1980/81.

Districts	TOTAL Area (ha)	TOTAL %	LENTIL Area (ha)	LENTIL %	CHICKPEAS Area (ha)	CHICKPEAS %
Azaz	16,853	40.0	11,711	41.5	5,142	30.0
Afrin	9,723	23.1	2,364	8.4	7,359	52.9
Al-Bab	1,731	4.1	1,725	6.1	6	0.0
Manbej	25	0.1	25	0.1	--	--
Jarablus	311	0.7	311	1.1	--	--
Ein Al-Arab	517	1.2	463	2.6	54	0.4
Jabal-Sama'an	10,295	24.5	8,963	31.8	1,332	9.6
Al-Sfireh	2,667	6.3	2,653	9.4	14	0.1
TOTAL	42,122	100.0	28,215	100.0	13,907	100.0

Source: Statistical Abstract Statistics for Aleppo Province 1982, Central Bureau of Statistics, Syrian Arab Republic.

Table 2

Contribution of men, women and children as the percentage of hours spent in legume production.

Agricultural Activities	% Hours Spent in Each Task	MH	WH	CH	MHV	WHV	CHV	MHO	WHO	CHO	Total	Total Contributions M	W	C
Tillage Operations	3.7	32	0	0	22	0	0	46	0	0	100	100	0	0
Seeding	1.5	30	14	0	25	0	0	31	0	0	100	86	14	0
Fertilizer use	0.9	49	19	0	13	0	0	19	0	0	100	81	19	0
Hand weeding	16.1	12	63	6	1	18	0	0	0	0	100	13	81	6
Pest and Rodent Control	2.5	51	29	0	11	0	0	9	0	0	100	71	29	0
Harvesting	58.4	9	22	3	1	26	4	3	24	8	100	13	72	15
Transport	5.3	36	26	0	36	0	0	2	0	0	100	74	26	0
Threshing	6.6	27	37	13	13	0	0	10	0	0	100	50	37	13
Winnowing	1.6	48	9	0	41	2	0	0	0	0	100	89	11	0
Cleaning	2.4	34	66	0	0	0	0	0	0	0	100	34	66	0
Bagging	1.0	44	56	0	0	0	0	0	0	0	100	44	56	0
Total	100.0	16	30	4	6	18	2	5	14	5	100	27	62	11

Source: Villages surveyed in study.

MH = men from household
WH = women from household
CH = children from household

MHV = men hired from village
WHV = women hired from village
CHV = children hired from village

MHO = men hired from outside
WHO = women hired from outside
CHO = children hired from outside

M = men
W = women
C = children

Table 3

Contribution of men, women and children as the percentage of the total time spent in cereal production.

Agricultural Activities	% Hours Spent in Each Task	MW	WH	CH	MHV	WHV	CHV	MHO	WHO	CHO	Total	Total Contributions M	W	C
Tillage Operations	10.1	32	0	0	27	0	0	41	0	0	100	100	0	0
Seeding	5.1	19	14	0	26	0	0	41	0	0	100	86	14	0
Fertilizer use	11.0	31	21	0	17	0	0	30	0	0	100	78	21	1
Herbicides use	0.8	20	5	0	0	0	0	75	0	0	100	95	5	0
Hand weeding	20.6	5	87	8	0	0	0	0	0	0	100	5	87	8
Rodent control	8.5	54	27	0	19	0	0	0	0	0	100	73	27	0
Harvesting	26.2	9	35	6	11	17	4	14	3	1	100	34	55	11
Transport	12.0	34	16	0	40	0	0	10	0	0	100	84	16	0
Threshing	4.6	34	37	2	27	0	0	0	0	0	100	61	37	2
Winnowing	0.4	47	17	0	36	0	0	0	0	0	100	83	17	0
Cleaning	0.4	21	61	0	6	12	0	0	0	0	100	27	73	0
Bagging	0.2	66	34	0	0	0	0	0	0	0	100	66	34	0
Total	100.0	22	37	3	17	4	1	15	1	0	100	54	42	4

Source: Villages surveyed in study.

MH = men from household
WH = women from household
CH = children from household

MHV = men hired from village
WHV = women hired from village
CHV = children hired from village

MHO = men hired from outside
WHO = women hired from outside
CHO = children hired from outside

M = men
W = women
C = children

Table 4

Contribution of men, women and children as the percentage of hours spent in summer crop production.

Agricultural Activities	% Hours Spent in Each Task	MH	WH	CH	MHV	WHV	CHV	MHO	WHO	CHO	Total	Total Contributions M	W	C
Tillage Operations	11.1	24	0	0	29	0	0	47	0	0	100	100	0	0
Planting & replanting	20.0	18	57	0	0	24	0	0	1	0	100	18	82	0
Thinning, weeding and loading	27.0	36	62	2	0	0	0	0	0	0	100	36	62	2
Cutting tops and thinning fruit	24.0	75	24	1	0	0	0	0	0	0	100	75	24	1
Fertilizer uses and irrigating and furrowing	3.0	91	9	0	0	0	0	0	0	0	100	91	9	0
Spraying insecticide, fungicide & guarding	2.0	27	57	16	0	0	0	0	0	0	100	27	57	16
Harvest and transport	13.0	33	41	18	0	0	8	0	0	0	100	33	41	26
Total	100.0	42	40	4	3	5	1	5	0	0	100	50	45	5

Source: Villages surveyed in study.

MH = men from household
WH = women from household
CH = children from household

MHV = men hired from village
WHV = women hired from village
CHV = children hired from village

MHO = men hired from outside
WHO = women hired from outside
CHO = children hired from outside

M = men
W = women
C = children

Table 5

Contribution of men, women and children as the percentage of hours spent in tree crop production.

Agricultural Activities	% Hours Spent in Each Task	MH	WH	CH	MHV	WHV	CHV	MHO	WHO	CHO	Total	Total Contributions M	W	C
Tillage Operations	16.0	23	0	0	27	0	0	50	0	0	100	100	0	0
Planting & hilling	22.0	19	62	0	15	4	0	0	0	0	100	34	66	0
Pruning & gathering	35.0	57	30	0	9	0	0	4	0	0	100	70	30	0
Hoeing, irrigating & fertilizer use	24.0	78	8	0	14	0	0	0	0	0	100	92	8	0
Pest control and fungicide	1.0	6	83	0	0	0	0	11	0	0	100	17	83	0
Weeding and thinning	2.0	21	79	0	0	0	0	0	0	0	100	21	79	0
Total	100.0	47	28	0	14	1	0	10	0	0	100	71	29	0

Source: Villages surveyed in study.

MH = men from household
WH = women from household
CH = children from household
MHV = men hired from village
WHV = women hired from village
CHV = children hired from village
MHO = men hired from outside
WHO = women hired from outside
CHO = children hired from outside

M = men
W = women
C = children

Table 6

Contribution of men, women and children as the percentage of the total time spent in on-farm agricultural production.

Contribution	Cereals	Legumes	Summer Crops	Trees	Total
A. Household					
Men	22	16	42	47	24
Women	37	30	40	28	32
Children	3	4	4	0	3
Sub-total	62	50	86	75	59
B. Hired from Village					
Men	17	6	3	14	11
Women	4	18	5	1	12
Children	1	2	1	0	2
Sub-total	22	26	9	15	25
C. Hired from Outside					
Men	15	5	5	10	8
Women	1	14	0	0	6
Children	0	5	0	0	2
Sub-total	16	24	5	10	16
D. Grand Total					
Men	54	27	50	71	43
Women	42	62	45	29	50
Children	4	11	5	0	7

Source: From villages surveyed in study.