Agricultural Production Systems and Resource Management Study in Zone 2 in Syria

BY

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1. Introduction

The need for studying the agricultural production systems in zone 2 emerged from some clear indications that agricultural activities in zone 2 are changing continuously. This zone is the area with annual rainfall of 250-350 mm in not less than two-thirds of the monitored years. The area of this zone is 2,473,000 hectares, which represents 13.4% of the country's area and about 40% of the cultivable land. Twenty years ago, this zone was described as "a dry area suitable for cereal growing and animal husbandry", or "cereal production and animal raising areas". Now the situation is different; trees are introduced in these areas especially olives, grapes, and pistachio. The importance of supplemental irrigation is increasing. Farmers started to practice new non-conventional activities which led to new problems that need investigation.

This study is important for both, Directorate of Agricultural and Scientific Research (DASR) and ICARDA. For DASR, because it updates information and data related to zone 2 which helps in finding solutions for existing problems in this zone and giving suitable recommendations which could be applied by decision makers. For ICARDA, the study is important because there are several indications that agricultural activities in the barley/livestock system in Syria is changing very rapidly, especially in Zone 2. This farming system which was classified, 20 years ago, as a cropping system of dryland cereals has been extremely diversified through the widespread introduction of tree planting and the increase of artesian wells and pumps. Farmers have been involved in a new range of non-traditional activities and now encounter a new range of problems. Therefore, there is a need to check whether the definition and concepts of barley/livestock system is still valid, and to assess type and magnitude of changes occurred in order to adjust technology research in ICARDA to match these changes.

2. Objectives

The immediate objectives of this study could be summarized in the following points:

1. To describe the present land and water use systems applied in zone 2, including the cropping systems and the animal husbandry practices.

2. To describe the recent historical evaluation of the farming systems and the factors associated with the change, including the prediction of possible changes in the short or

medium term.

3. To view the farmers' priorities regarding the use of their land and water resources, including crop preferences at different levels of resource use.

4. To view the farmers' perceptions to the nature of the resource regarding its limitation, renewability, and depletion.

5. To look into the questions of wheat and barley production trade-offs, ground water use and allocation decisions, incentives and constraints to tree crop production, and perceived constraints to productivity within the various farming systems.

The primary strategy which will be followed in this research includes two stages:

1. First stage will be conducting rapid appraisal (informal survey) by visiting different locations in zone 2 for obtaining insights into the farming system, identifying major constrains, and guiding the planning, design, and implementation of a farm survey required for more quantification.

2. Second stage will be interviewing farmers (formal survey) to complement the first stage.

3. Analysis of some secondary data

The findings for Zone 2 rainfed farms, including those with supplemental irrigation, extracted from our previous three years of adoption and impact surveys of wheat farmers. The analysis indicated that several issues related to land and water use which became obvious in zone 2, can be listed as following:

1. The competition between wheat and barley under completely rainfed conditions.

2. High adoption level of improved wheat varieties versus low adoption level of improved barley varieties.

3. The difference in land use among farmers of the North East (Jezirah), the North West (Aleppo, Idleb, Hama, and Homs), and the South (Hauran), which may result in three different farming systems.

4. The types of change in resource management (land and water) and other contributing factors may differ among these areas.

4. Summary of rapid appraisal findings

During 1994/1995 season, a multidisplinary team from DASR and ICARDA; including

Economists, Anthropologist, Agronomist, and Livestock scientist; conducted four field trips in Syria. They visited Hama, Homs, Aleppo, Dara', Sweida, Hasakeh and Raqqa provinces and met many officials in charge of Agriculture and Agricultural Extension, and interviewed many farmers after a checklist was prepared, in additional to some field observations. the following points are the summary of findings in each region:

1 Hama and Homs region

The four locations which were visited share in having experienced big changes, but the changes were different in each of them. In the first location (Maar Shehour area), there was competence between tree planting and sheep keeping. In the second location (Sheikh Ali Kasoun area), there was special farming system which differs from the previous one and from the following one. In the third location (Kseir area), farmers tend to grow irrigated crops, while in the fourth location (Zeidal area), they prefer fruit trees especially grapes.

Farmer's strategy is built on the availability of surface or ground water in his farm and its quantity and persistence. Farmer is affected by several factors when making a decision on planting his land with trees or growing certain crop; the most important factors are:

1. Availability of natural resources to his farm.
2. Availability of funds.
3. Adaptability of crops to his field.
4. Choice, which is influenced by inputs, labors, agricultural plan, prices, economic considerations.

There are also interactions among these factors.

Concerning types of soils in the four locations, they could be gathered in three groups as follows:

1. Shallow soils or stony soils which could be left as rangelands or seeded with barley. When change occurs on these lands, they could be planted with fruit trees such as grapes, olives, pistachio, and almonds.

2. Good soils with no water source for irrigation, where farmers follow a three-course rotation (cereals / legumes / summer crop or fallow). Wheat is the most important cereal crop in this rotation, and lentil is the most important legume crop. Barley and vetch are also grown but in less quantities.

3. Good soils with irrigation source, where farmers prefer to grow improved varieties of wheat, summer crops like potatoes, sugar beets, and cotton.

2 Aleppo province

The introduction of irrigation has intensified the use of land in Zone 2 in Aleppo province. What used to be a barley/livestock farming system has changed in many areas of Zone 2 in Aleppo into vegetable-wheat-fruit production system, and in some cases cotton is also found. Livestock became a complementary activity to satisfy household needs for meat and milk products but it has been pushed towards the drier areas. There are a lot of unlicensed wells in operation. Farmers appear to be conscious that the depth of the groundwater is declining as more farmers are using more water. However, farmers appear to perceive water scarcity as a workable problem, they seem to trust that technological improvement will come up with solutions to their needs to increase land productivity.

Availability of irrigation has increased the use of fertilizer. Farmers, on average, use 200 kg/ha of phosphate and 250 kg/ha of Urea. Seed rate for cereal is very high and up to 400 kg/ha. Sometimes the higher planting densities are the means to arrest weed infestation. In most cases, farmers have an apparent economically rational explanation for their high input use.

Part time farming has increased with the proximity of the urban areas and the presence of better roads that allow day-to-day communication. Development of poultry farms has increased also as a result of urban development. Land markets and land speculation seem to be developing in some of the visited areas.

Remittances from household members working abroad or working in the urban centers has improved the cash-flow situation of several farms. capital availability has permitted the acquisition of improved inputs of production or to develop farm investments.

Some villagers mentioned the problem of scarce labor to manage the olive orchards. When asked about the need for planning for the increase in labor and inputs necessary to establish and maintain the orchards, the farmers mentioned that they did not think in advance about these needs and outlays. Extension services are not always available or the extension personnel are not fully aware of what are the technological options in different provinces.

3 Hauran region

Wheat occupied the first rank in terms of cultivated area in zone 2 in Hauran region. Until few years ago, local durum varieties, especially Haurani, were the dominant varieties at this region due to the agricultural policy which did not accept improved wheat varieties to be introduced to Hauran region. But recently this agricultural policy has changed, and farmers started to adopt improved wheat varieties, especially Cham 3, which increased the yield on average by 50% compared to local varieties.

Land reform was done for some shallow soils and hilly lands to be planted by trees. The trend of barley area is declining by time, to be replaced by olive trees which started in 1985. Local Arabic Abied is the only barley variety grown in this region since no farmer knows about improved barley varieties. The dominant rotation is wheat/chickpea, lentil, vetch, summer crop or fallow.

Digging artesian wells started in Hauran ten years ago. Some farmers believe that the water level does not decline, because that area is surrounded by two mountains: the Sheikh mountain and the Arab mountain, where water is gathered in Hauran base.

As a result of water availability, vegetables are introduced and planted as irrigated crops. But farmers feel that vegetables planting is costly and its return is unstable, because it depends on free market; while wheat is safer and not risky from the economic point of view, due to the government subsidies policy. Legume crops, especially chickpeas, is increasing because of its good price. Therefore, economic problems which were faced by farmers in Hauran region may be more important than the technical ones.

Farmers did not face any problem related to labor force availability. In general, the number of household is enough to serve the farm. If more laborers are needed, it is possible to hire people from the near villages. There is specialization in farm work for men and women, where men usually irrigate crops while women carry out the harvesting. Average holding size range from 10 to 15 hectares; this size is declining by time due to the distribution among the children, in addition to selling to others in the case of small holding size which not be economically planted.

In Sweida province, there is a change from growing field crops towards planting trees, and the profitability from this change is not known because no economical study was carried out. All crops in Zone 2 in this province are rainfed since irrigated farming is not practiced and agricultural policy does not allow farmers to dig any new well in order to controlling the amount of ground water. There are some dams to collect rainfall water, but this water is used essentially for drinking.

Livestock in this area included sheep, goats and cattle, number of sheep is declining due to decreasing pasture area and increasing fruit trees area. But recently, number of cows started to increase and therefore, tendency became towards cow husbandry instead of sheep, and the decrease in livestock is another important issue in Hauran. And again it was noticeable that there was limited linkages between the extension units and research stations in Hauran region which is an important factor in detaining the farmers progress.

4 Al-Jazireh region

In zone 2, changes started to occur in early 1980s when number of artesian wells increased drastically and digging was done arbitrarily. Some irrigation enterprises converted those lands into irrigated ones. The agricultural policy prohibits planting fruit trees in the plains because they are allotted for field crops.

There is a noticeable transformation towards growing wheat. Nowadays, 90% of zone 2 is planted with wheat which replaced barley. Number of sheep is decreasing obviously. Each household retains a limited number of sheep for its own satisfaction.

Due to the introduction of irrigation, new crops were introduced, such as cotton. Some farmers

believe that water requirements for cotton are very high, and that the dominant rotation wheat/cotton is not successful because it does not include legumes such as soybeans which could be mechanized, although there are some marketing problems.

Labor force is available in zone 2 of Al-Jazireh area, although some laborers are brought from outside the province during peak periods such as lentil harvesting and cotton picking. Mechanical harvest for lentils is practiced by some big farmers who use the conventional combine with some modifications. Small farmers prefer manual harvesting because the value of the hay covers the expenses of harvesting. This is in addition to the use of old local varieties.

The household income increased significantly due to the expansion of public schemes. In case of rainfed farming, there were some dry years when farmers could not harvest their barley. After irrigation was introduced, the household income increased nearly five folds compared to rainfed farming. There is still potential for raising this income. In spite of this, farmers face some problems like shortage of water, especially at critical periods, and unavailability of desirable wheat varieties, unavailability of fertilizers and seeds at the required timing and quantity. Farmers do not analyze their soils.

In case of irrigated farming depending on artesian wells, it was noticed that most wells were drilled at depths of 200 meters or more. Some of these wells has calcareous water, others has sulfuric water. The dominant system for irrigation is by flooding which result in wasting a lot of water. It is noticeable that there is a decline in the ground-water level in most of the locations visited.

Durum wheat is dominant in the Jazireh region. About 75% of the total wheat area is planted with durum wheat, while bread wheat is planted in 25% of the total wheat area. Cham 3 is the most common durum wheat, while Cham 6 is the most common bread wheat. Some farmers suffer from nematodes in their soils due to continuous growing of wheat in the same piece of land.

There is no direct relationship or exchange of information among agricultural departments and extension units in different areas of the province. For example, there is no direct exchange of information between agricultural department in Abu Rasein which has long experience with irrigated crops, and extension unit in Sayyed Ali where irrigation started two years ago.

During the field trip, it was noticed that most wheat fields were burned in order to plough it and plant it for the winter season.

However, most changes occurred to the farming system in zone 2 was due to the introduction of full or supplemental irrigation which resulted in a significant increase in agricultural production, especially cereals. At the same time, irrigation eliminated the fallow system which was practiced earlier, and decreased the area of marginal lands which resulted in big decline in the number of sheep in that area (Figure 1).

Due to the substantial increase of agricultural production by irrigation, crop residues were

increased. However, there are not enough livestock to graze these residues during a relatively short period not exceeding three months. In addition to that, the available family labor force does not encourage the farmer to have a large number of livestock, since it needs full-time labors. At the same time, irrigated farming demands intensive labor force. For these reasons, the farmer prefers to burn crop residues to prepare his land for the next season. This practice results in land deterioration. Therefore, it is important to search for a new farming system which integrates cropping and livestock raising in a better way, especially under irrigated farming which was introduced to this region.