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

Seminar prepared by

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1995

Research partners involved in this study:

→ **Directorate of Agriculture Scientific Research**
Socio-economic Research Department

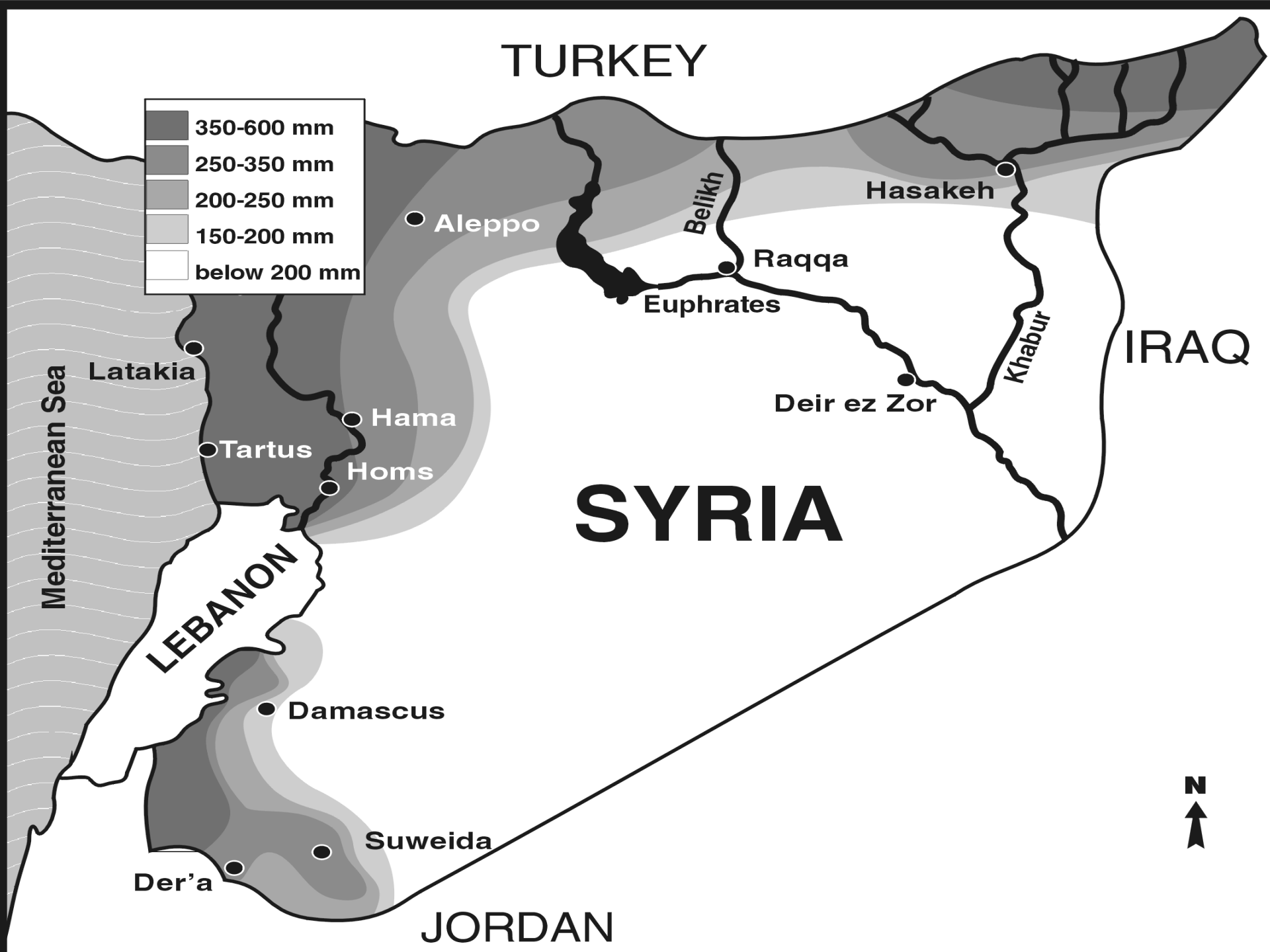
→**Aleppo University**
Agricultural Economics Department (2 M.Sc. Students)

→ICARDA
Production Systems, Adoption and Impact Project (NRMP)

The need for this study arose from some clear indications that agricultural activities in zone 2 have been changing rapid.


What Does Zone 2 Mean?

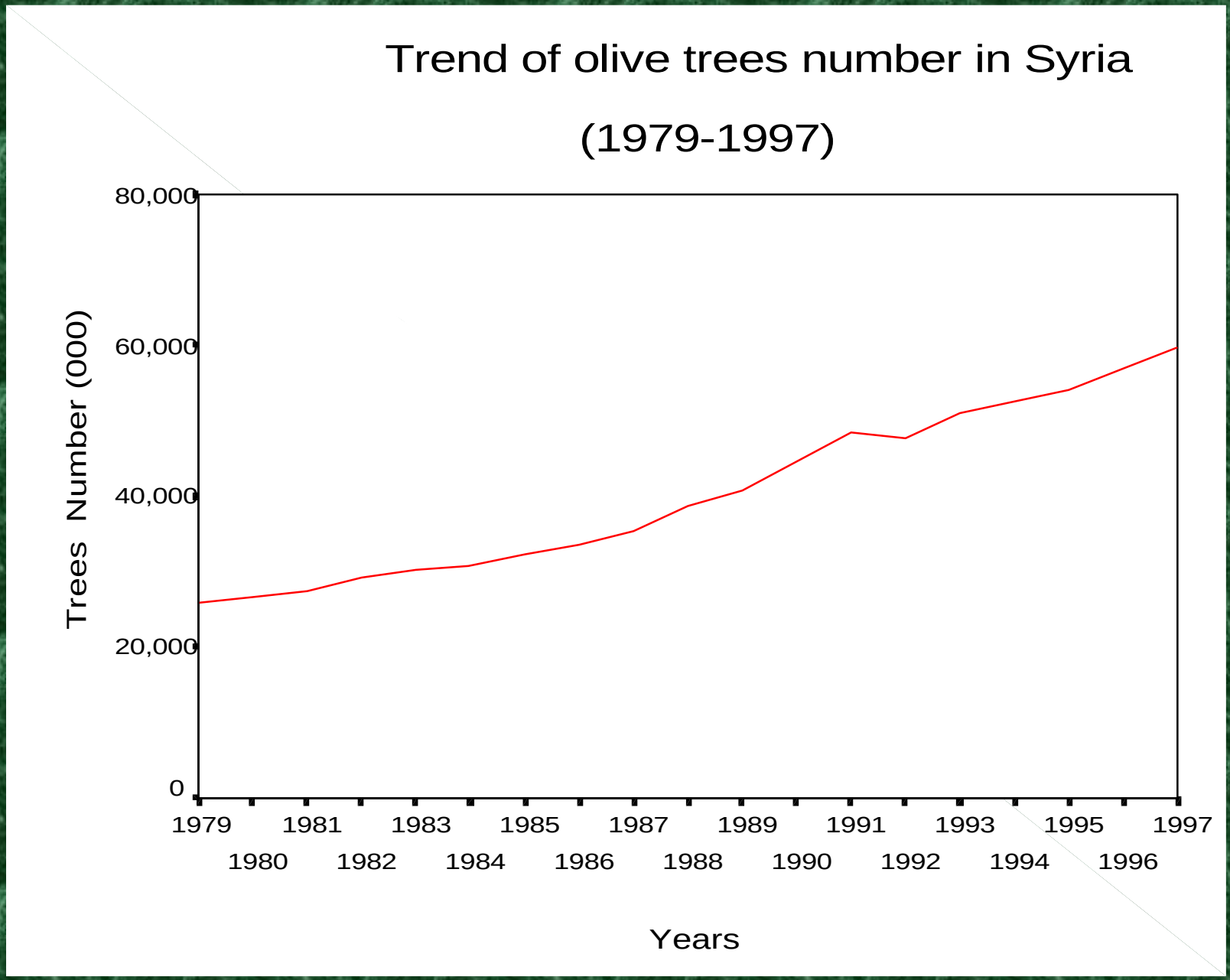
Zone 2 defined by MAAR as having annual rainfall of 250-350 mm in not less than two-thirds of years, covers about 2.47 million hectares, which is 13.4% of total area of Syria and about 40% of its cultivable land.


TURKEY
350-600 mm
250-350 mm
200-250 mm
150-200 mm
below 200 mm
Aleppo
Belikh
Hasakeh
Raqqa
Euphrates
Khabur
IRAQ
Latakia
Mediterranean Sea
Hama
Tartus
Homs
Deir ez Zor
SYRIA
LEBANON
Damascus
Suweida
Der'a
JORDAN
N

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 very different:

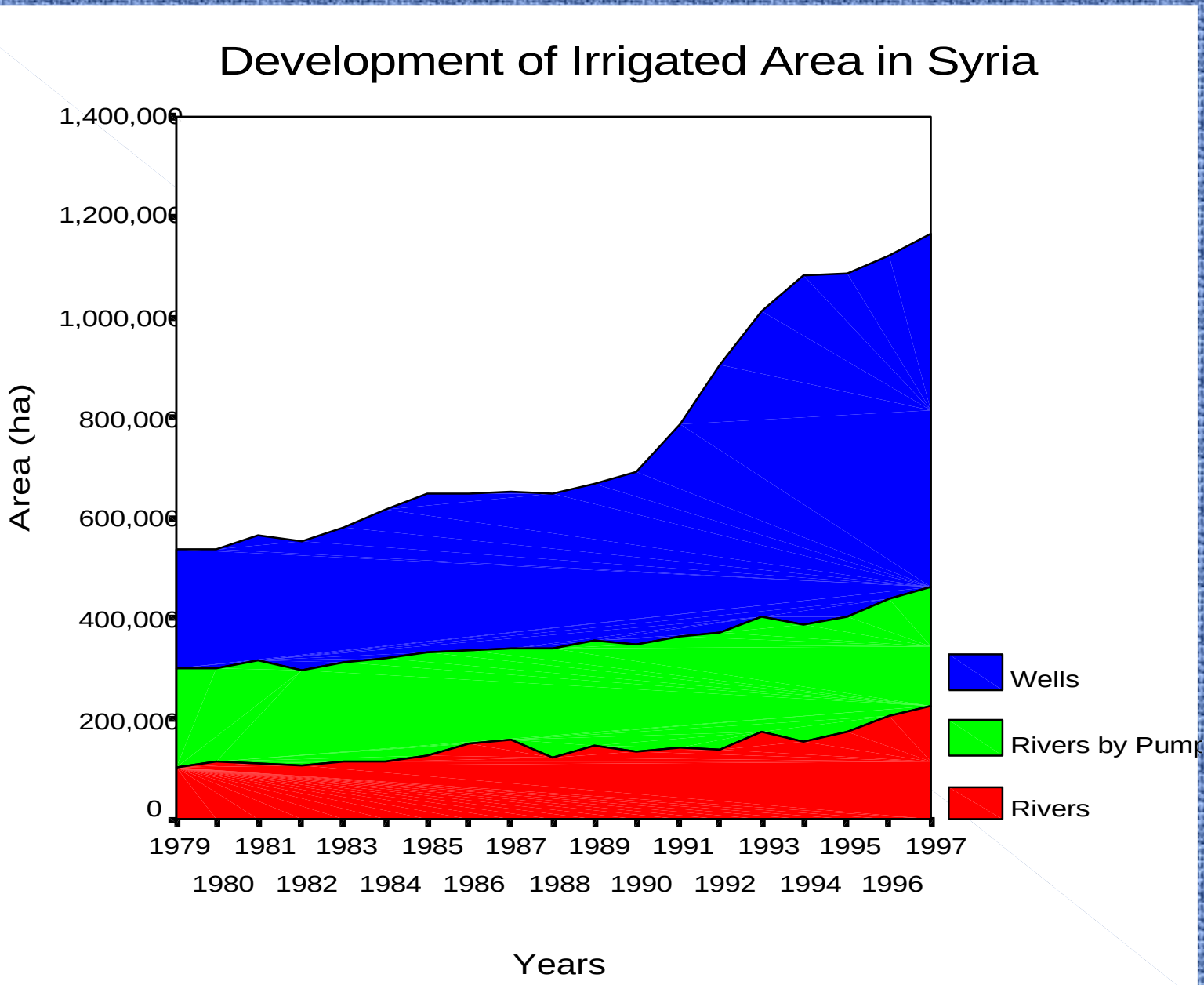
- **Trees, especially olives, grapes, and pistachio, have been widely planted.**


Trend of olive trees number in Syria
(1979-1997)
Trees Number (000)
80,000
60,000
40,000
20,000
0
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
Years

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 very different:

- **Trees, especially olives, grapes, and pistachio, have been widely planted.**
- **The increase of irrigation, based on the development of wells and pumps, and other irrigation systems has led to diversification of crops and production systems.**


Development of Irrigated Area in Syria
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Area (ha)
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
Years
Wells
Rivers by Pump
Rivers

Research Objectives:

The immediate objectives of this study are:

.To describe the present land and water use systems applied in zone 2.

.To describe the recent historical evaluation of the farming systems and the factors associated with it.

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

.To discover farmers' perceptions of their nature of the resource base and its limitation and renewability.

.To look into the questions *viz.*: 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 different farming systems.

This study is important for both research partners:

For the Directorate of Agriculture Scientific Research (DASR), because it updates information on zone 2.

For ICARDA, because it provides an easily accessible example (for research) of farming system dynamics under social, economic and technical pressures.

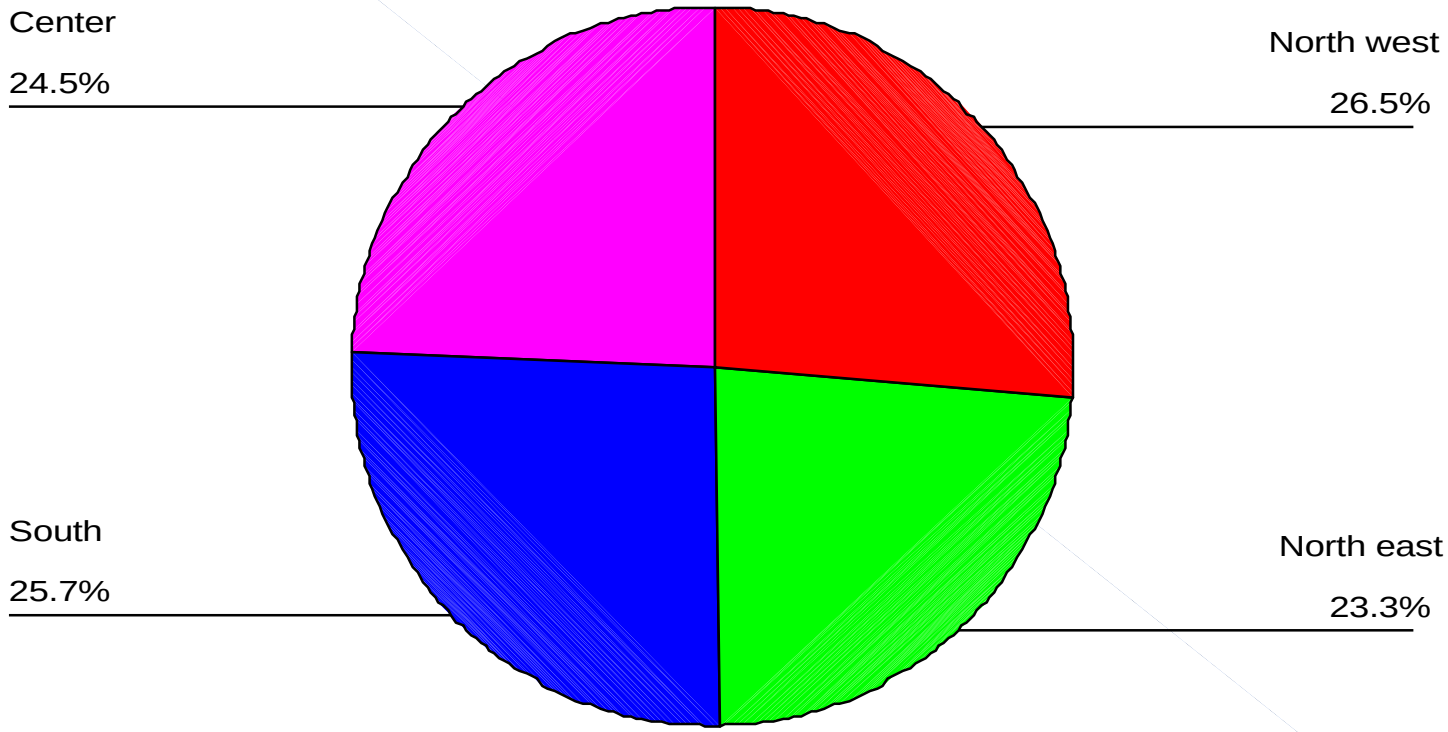
Research is being conducted in two stages:

.Rapid appraisal (informal survey) by visits different locations in zone 2 to obtain insights into the farming system, identifying major constrains, and guiding the planning, design, and implementation of the subsequent farm survey.

.Farmer interviews (formal survey) to complement the first stage and obtain more quantitative information.

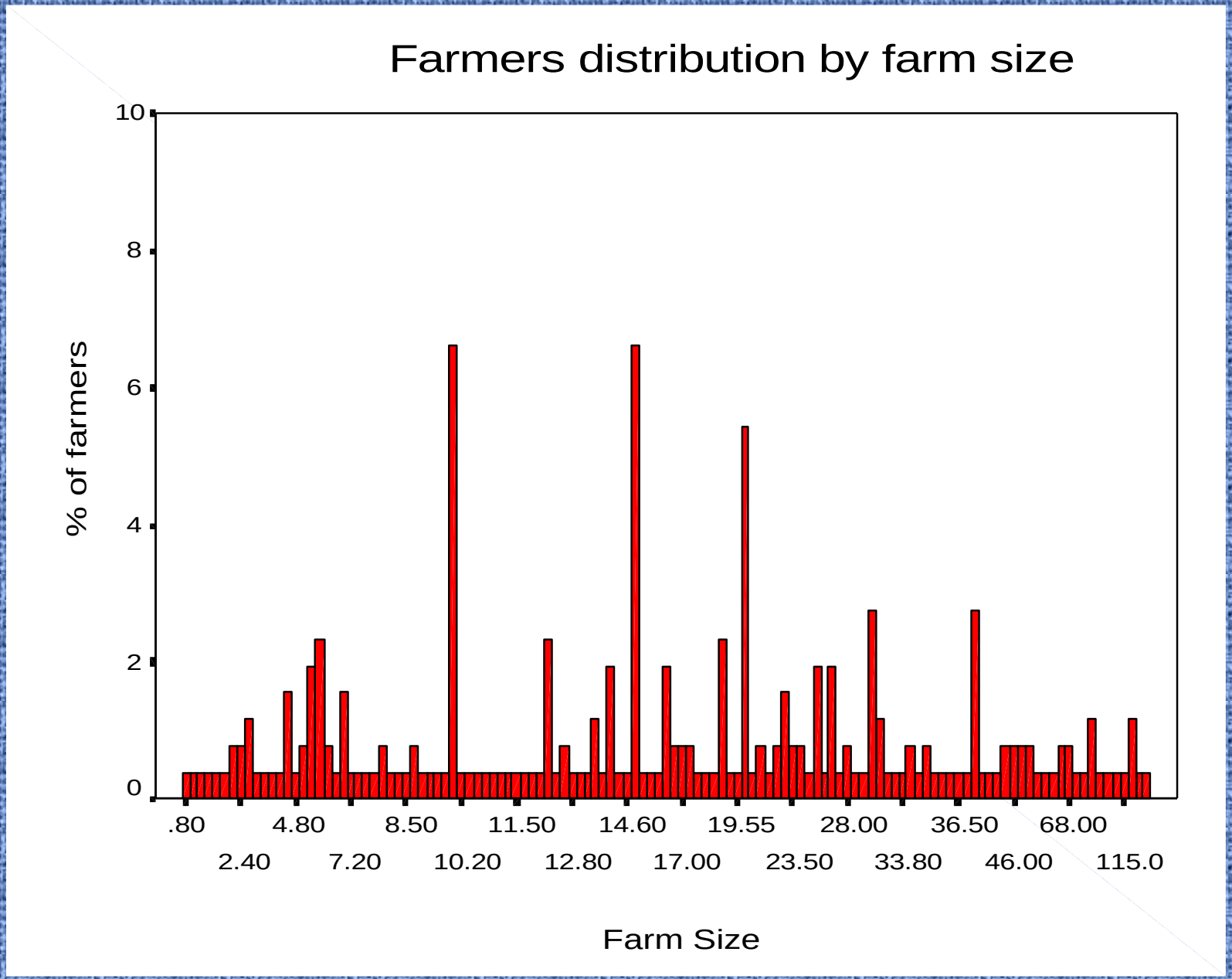
Sample distribution by Regions

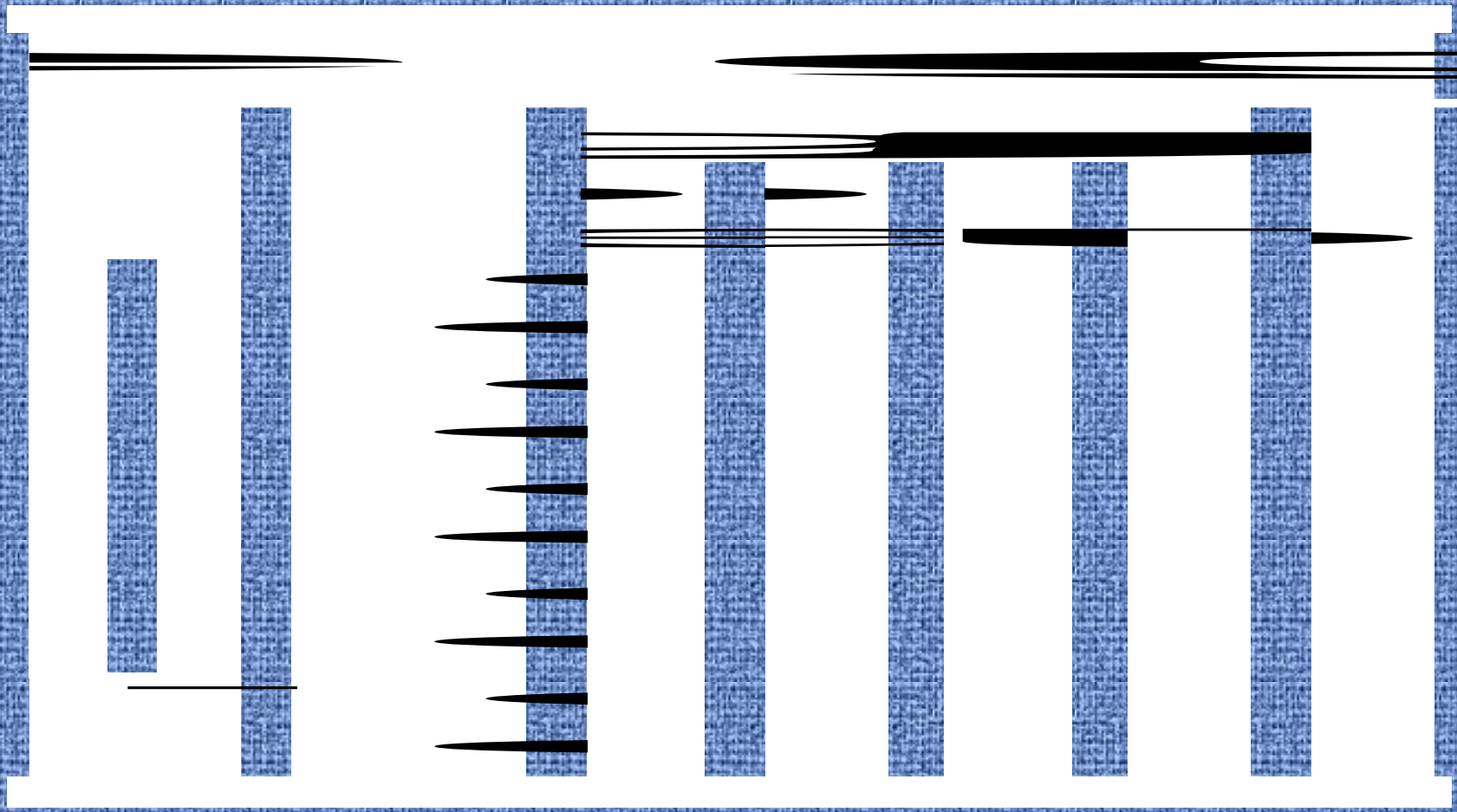
(N = 257 farmers)



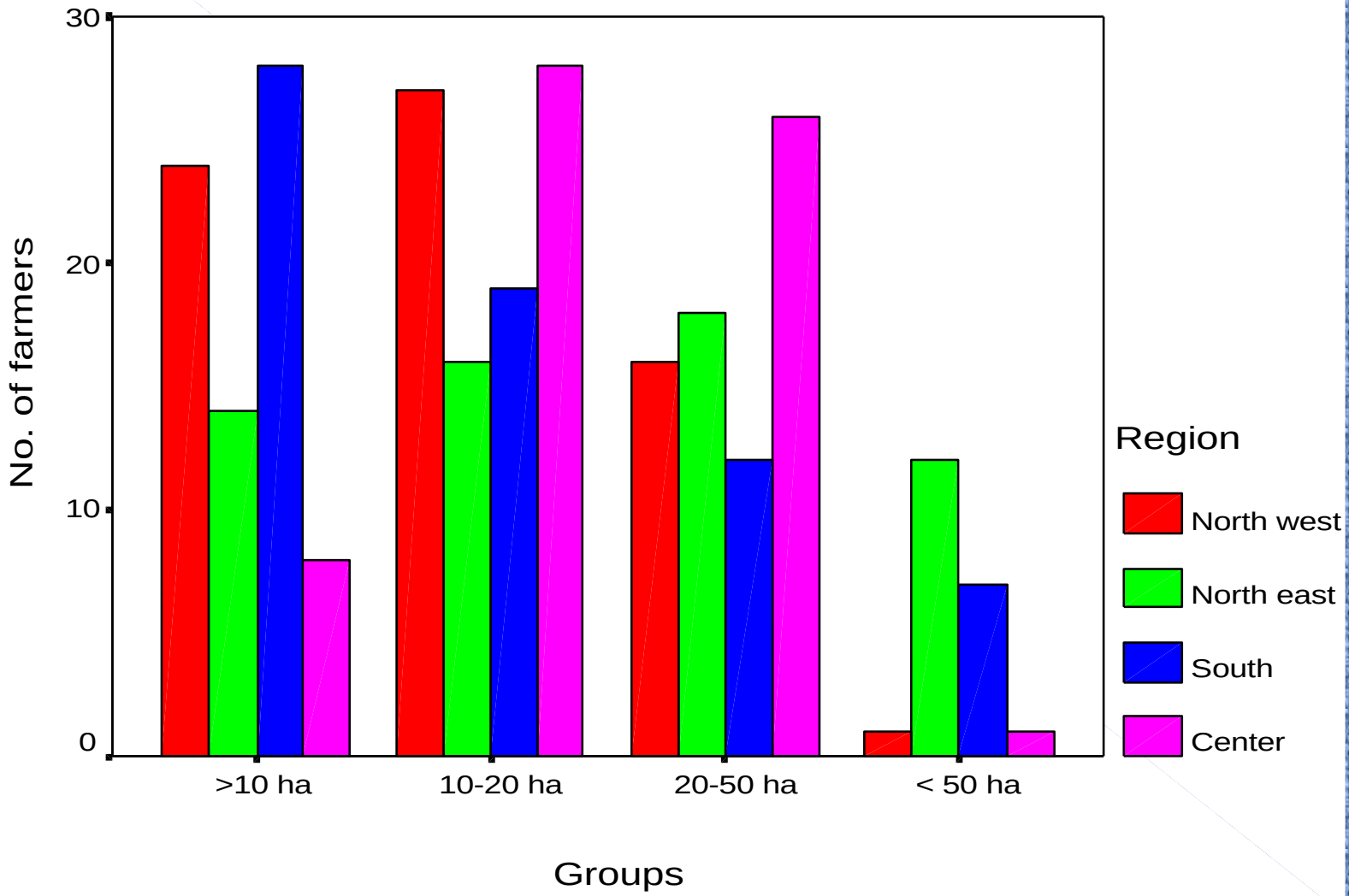
Farmers Characteristics

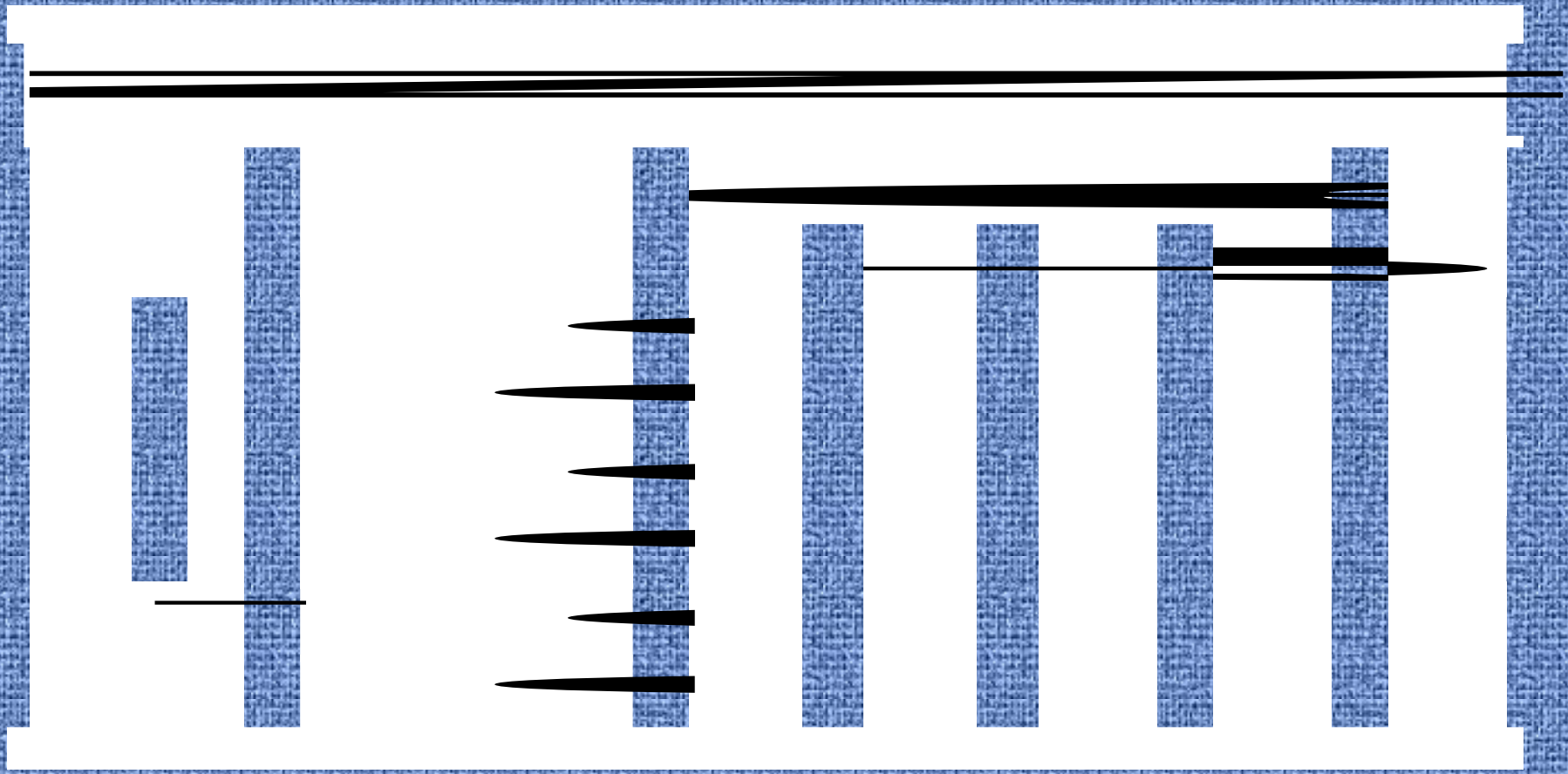
- Farmer's age 52 Years
- Experience in Agri. 33 Years
- Having off farm activity 48%
- Income from farm 76 %
- Income from off farm activities 24%
- No. of family members 15 Persons
- No. of men working in Agri. 3.4 men
- No. of women working in Agri. 3.2 Women
- No. of hired workers per year 280 daily Laborers
- Education
  - Illiterate 17%
  - Can read and write 29%
  - elementary 29%
  - Above elementary 25%

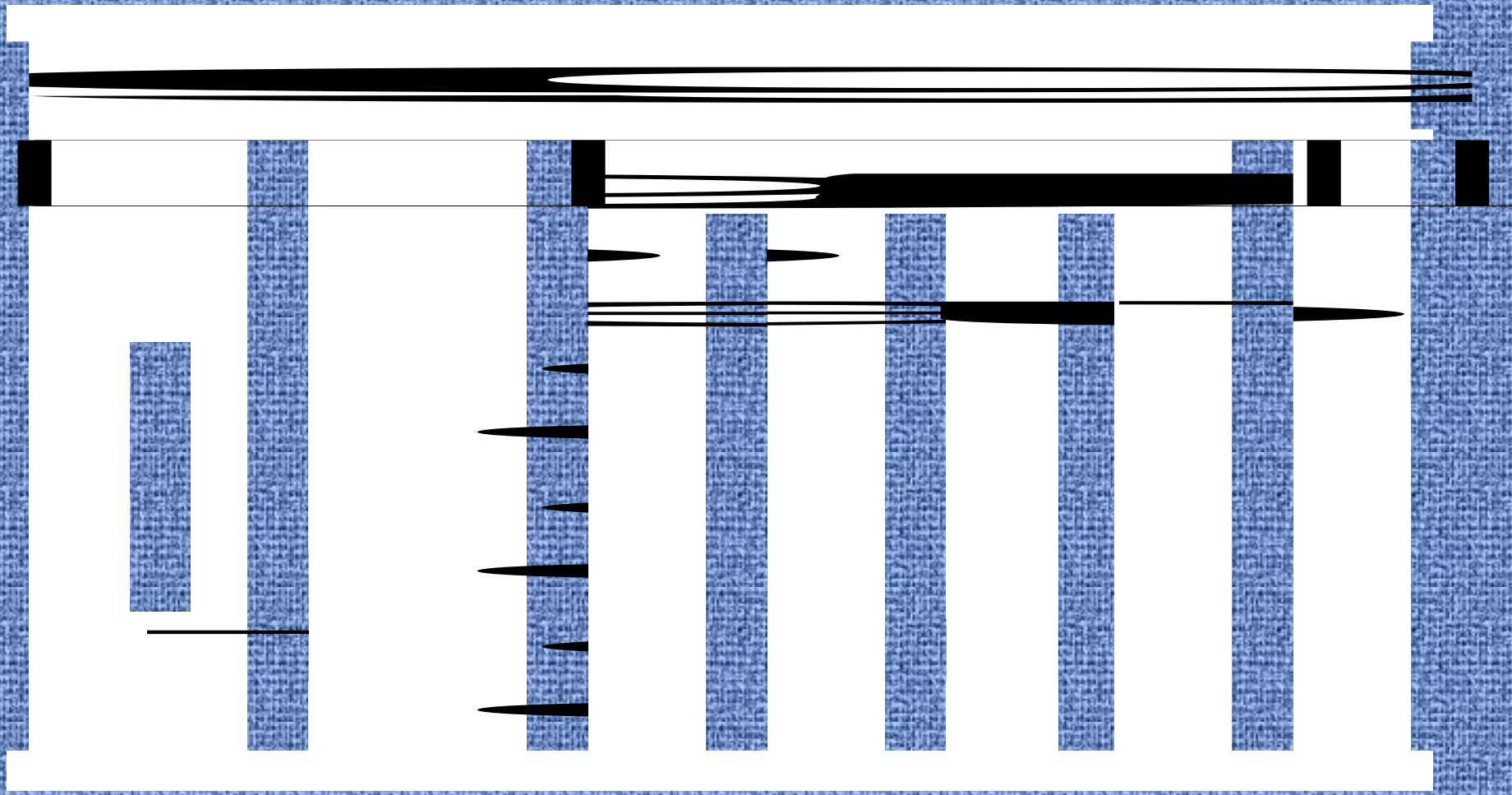

Farmers distribution by farm size
% of farmers
10
8
6
4
2
0
.80
2.40
4.80
7.20
8.50
10.20
11.50
12.80
14.60
17.00
19.55
23.50
28.00
33.80
36.50
46.00
68.00
115.0
Farm Size



Distribution of farmers in the sample according to farm size groups







Farmer's strategy in Zone 2 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:

- **Availability of natural resources to his farm.**
- **Availability of funds.**
- **Adaptability of crops to his field.**
- **Choice, which is influenced by inputs, labors, agricultural plan, prices, and economic factors.**

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

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

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- ***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.

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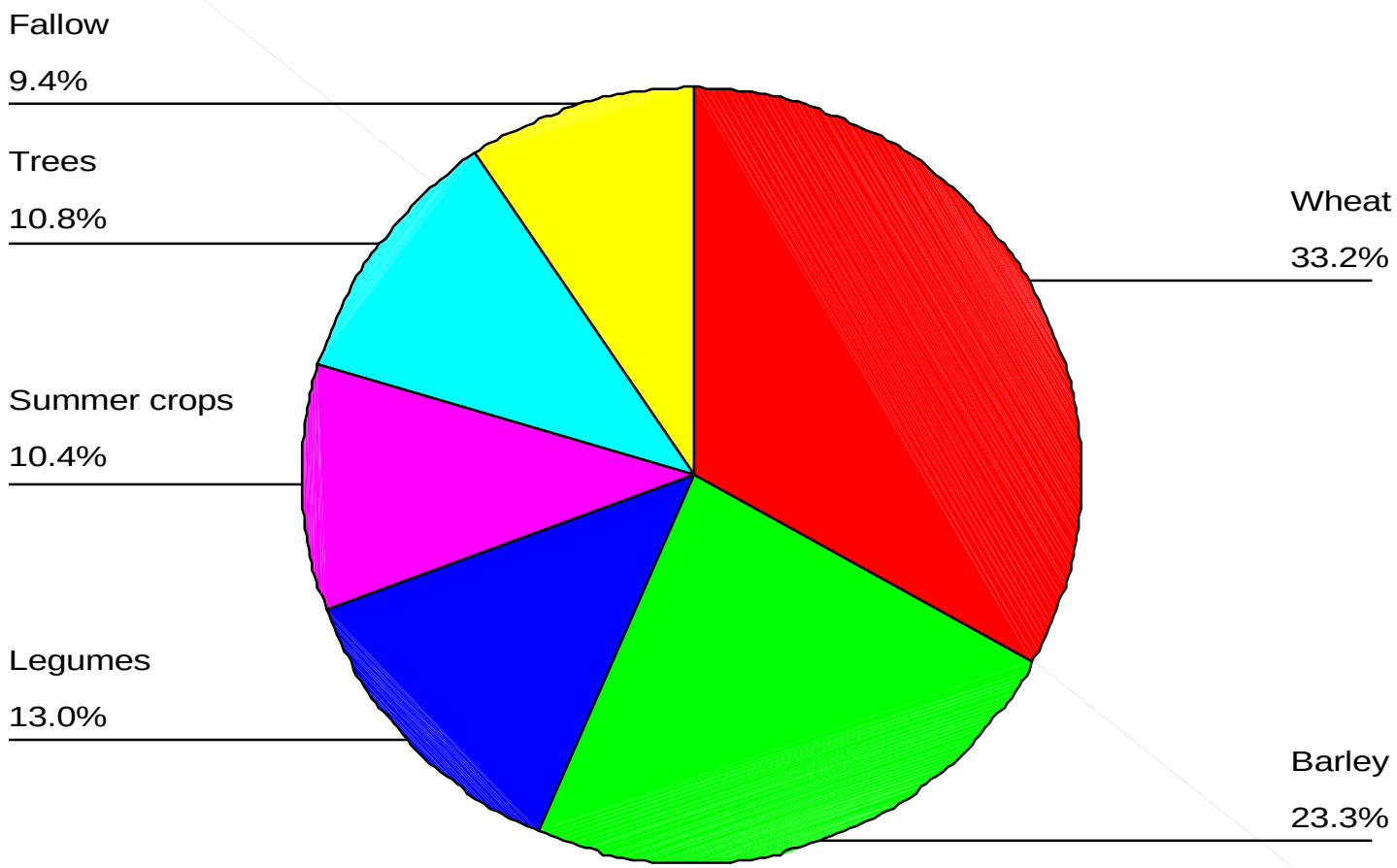
- ***Good soils with irrigation source***, where farmers prefer to grow improved varieties of wheat, summer crops like potatoes, sugar beets, and cotton.

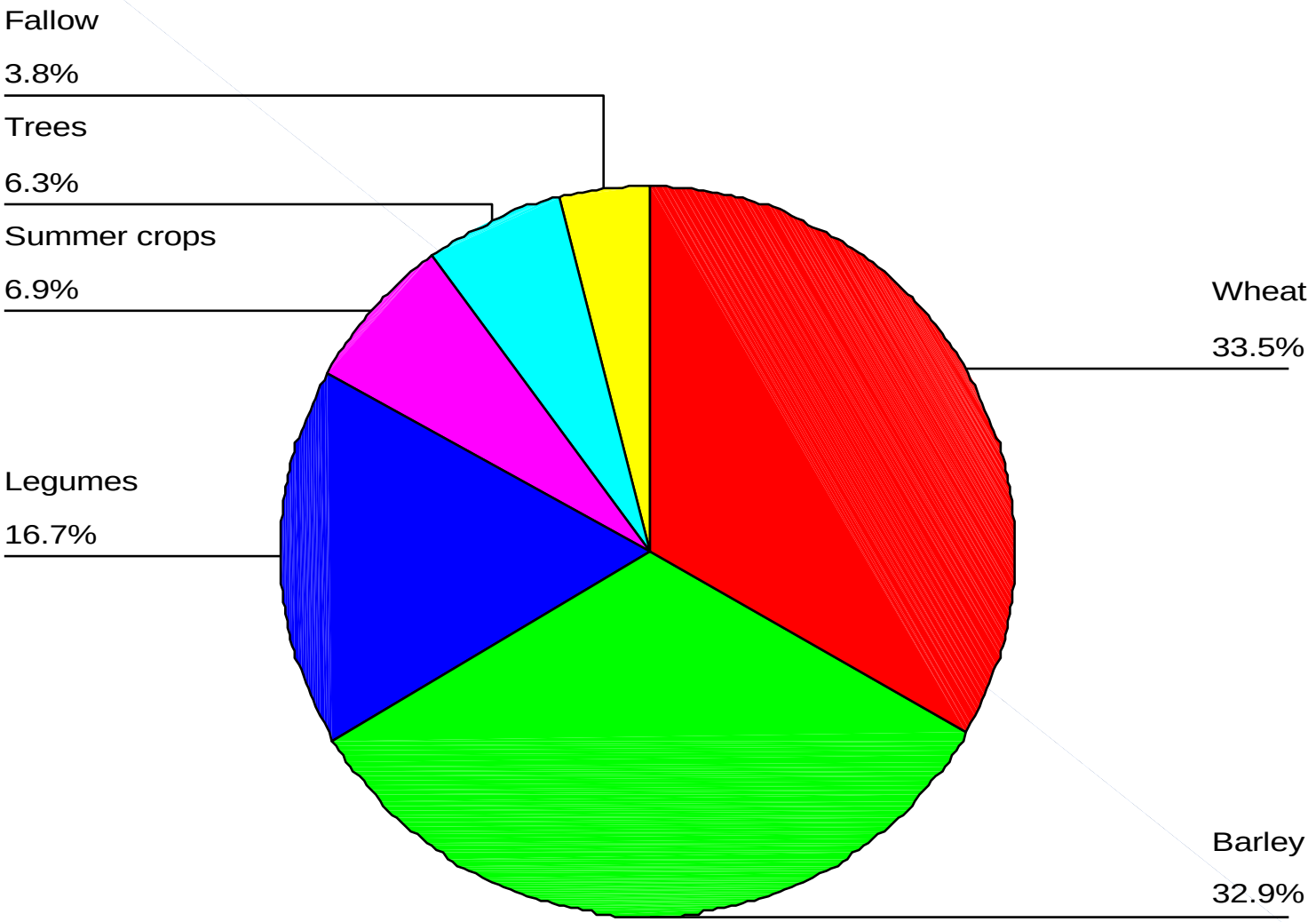
Land Use and Crop Pattern

Land Use in Zone 2 in Syria

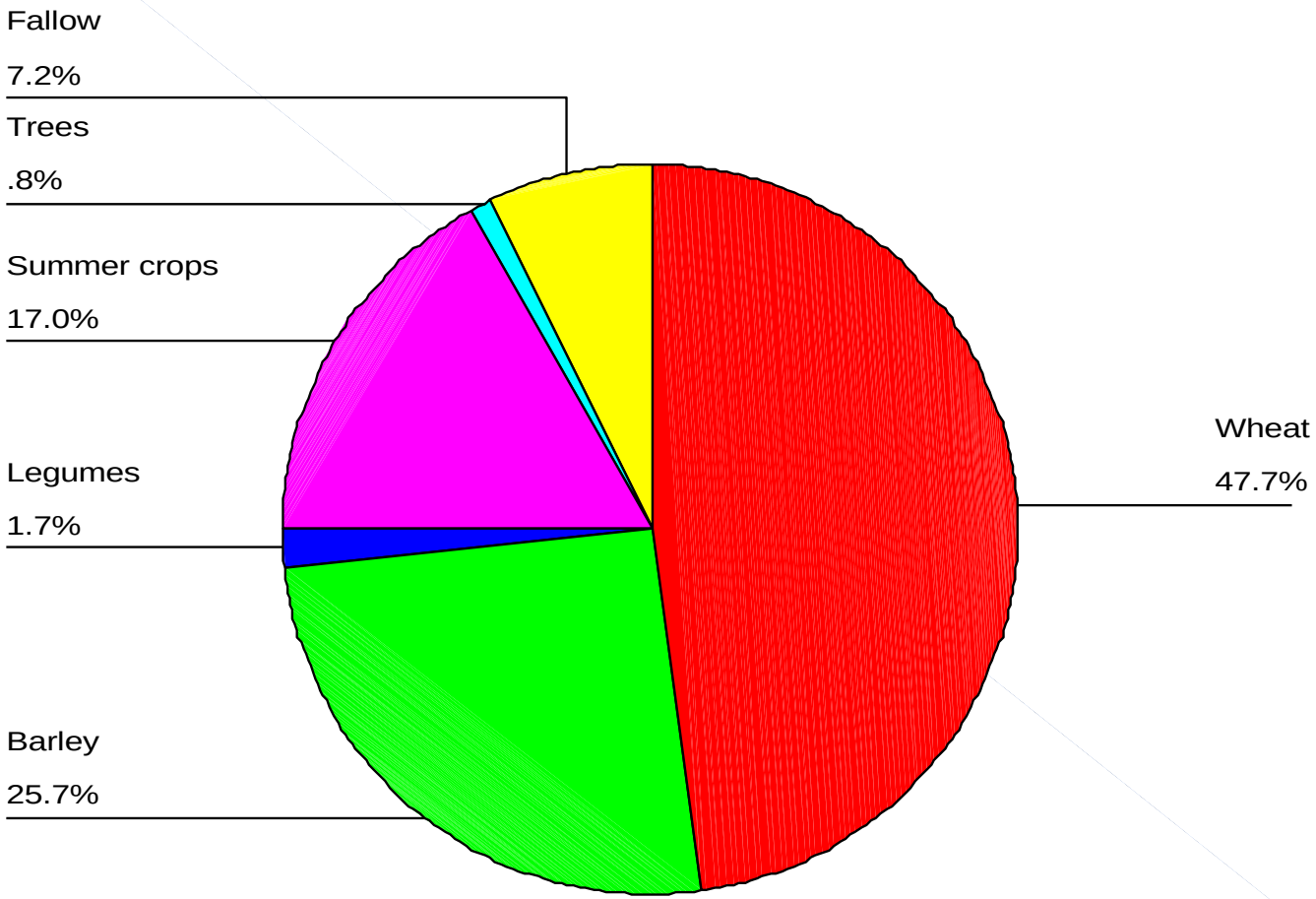


Land use contrasts between farmers of the North East (Jezirah), the North West (Aleppo, Idleb), the central (Hama, and Homs), and the South (Hauran), which may indicate four different farming systems; and different types of change in resource management (land and water) and other factors between these areas.

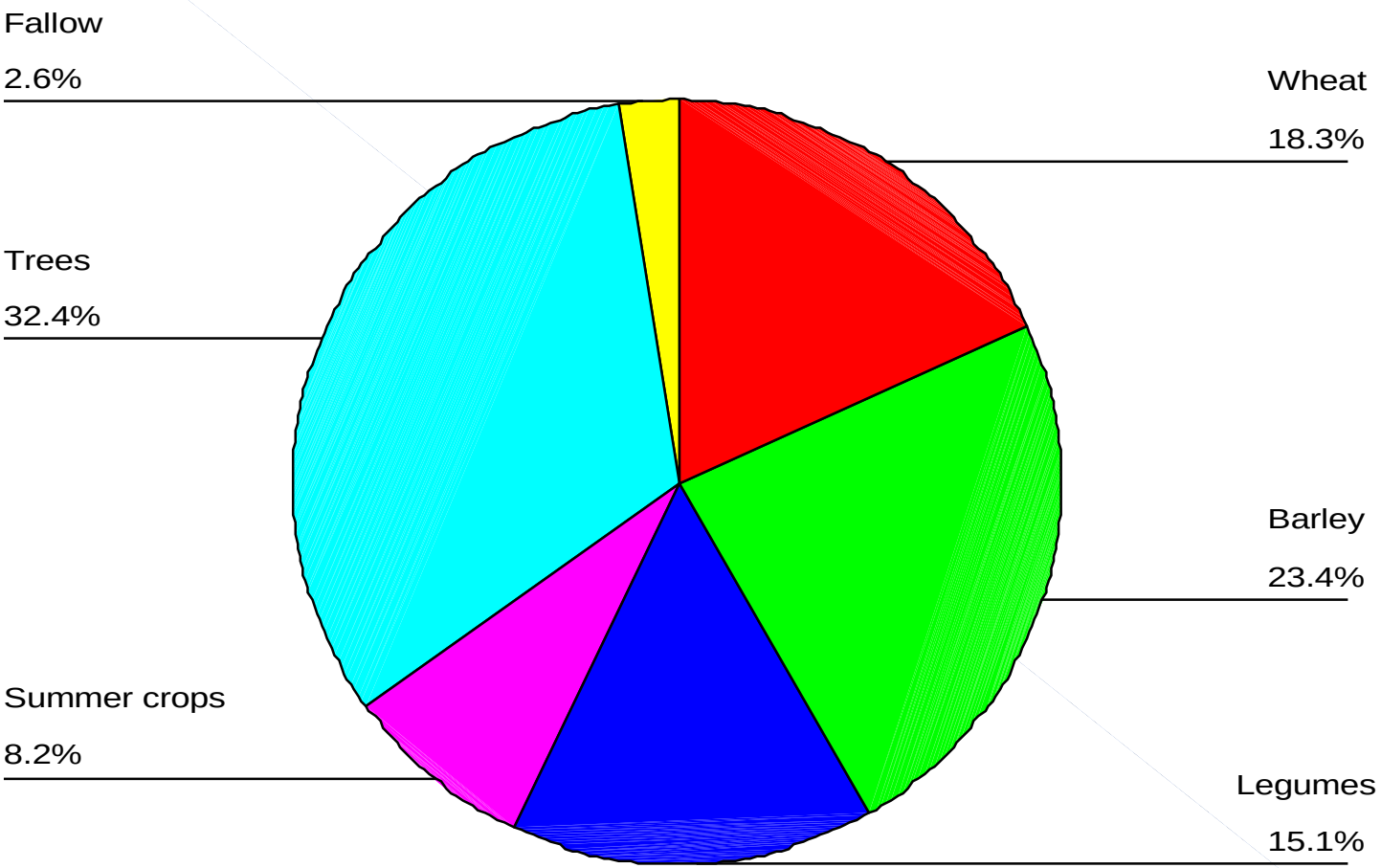
Land Use in Zone 2 in North-West Region

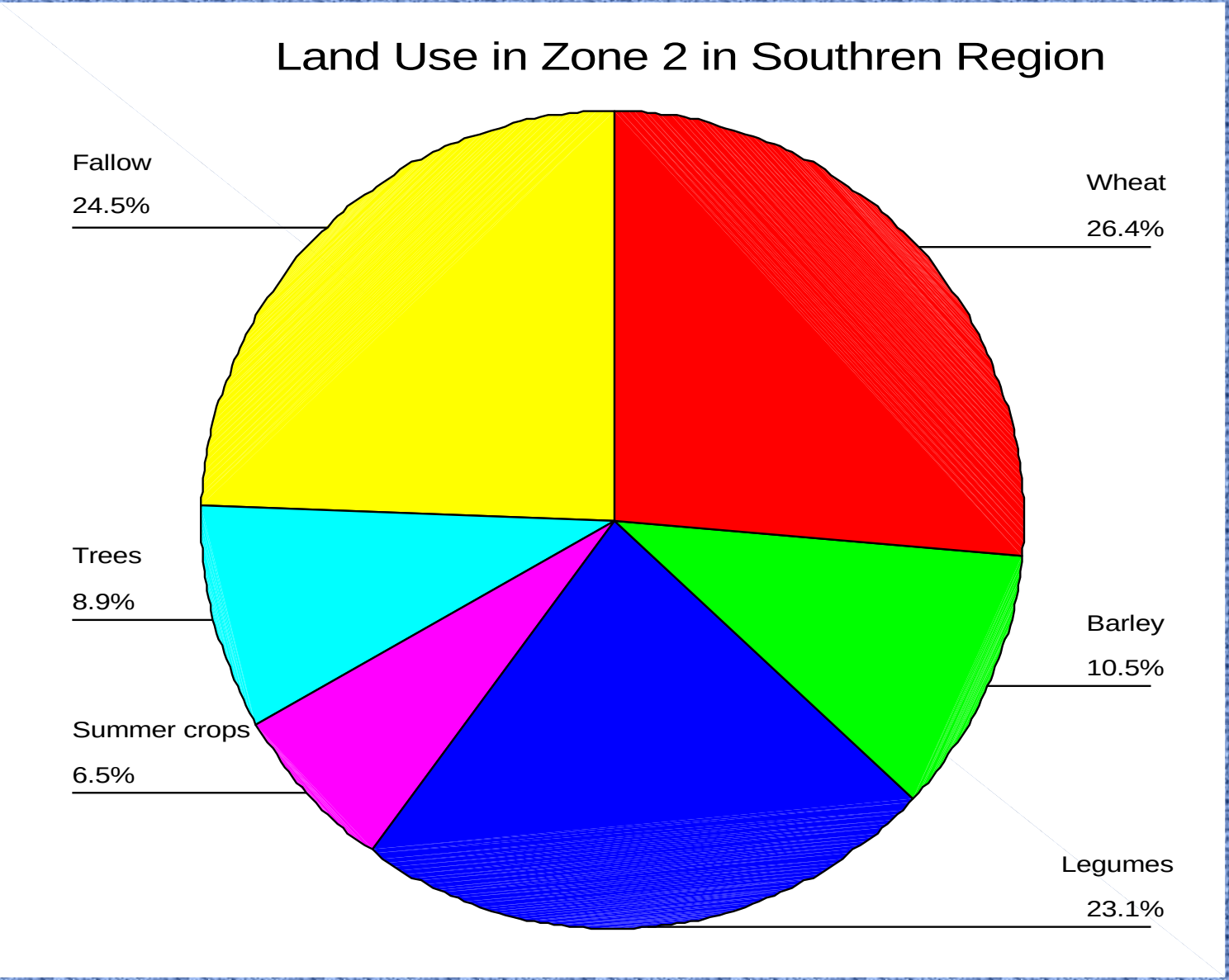


Land Use in Zone 2 in North-East Region

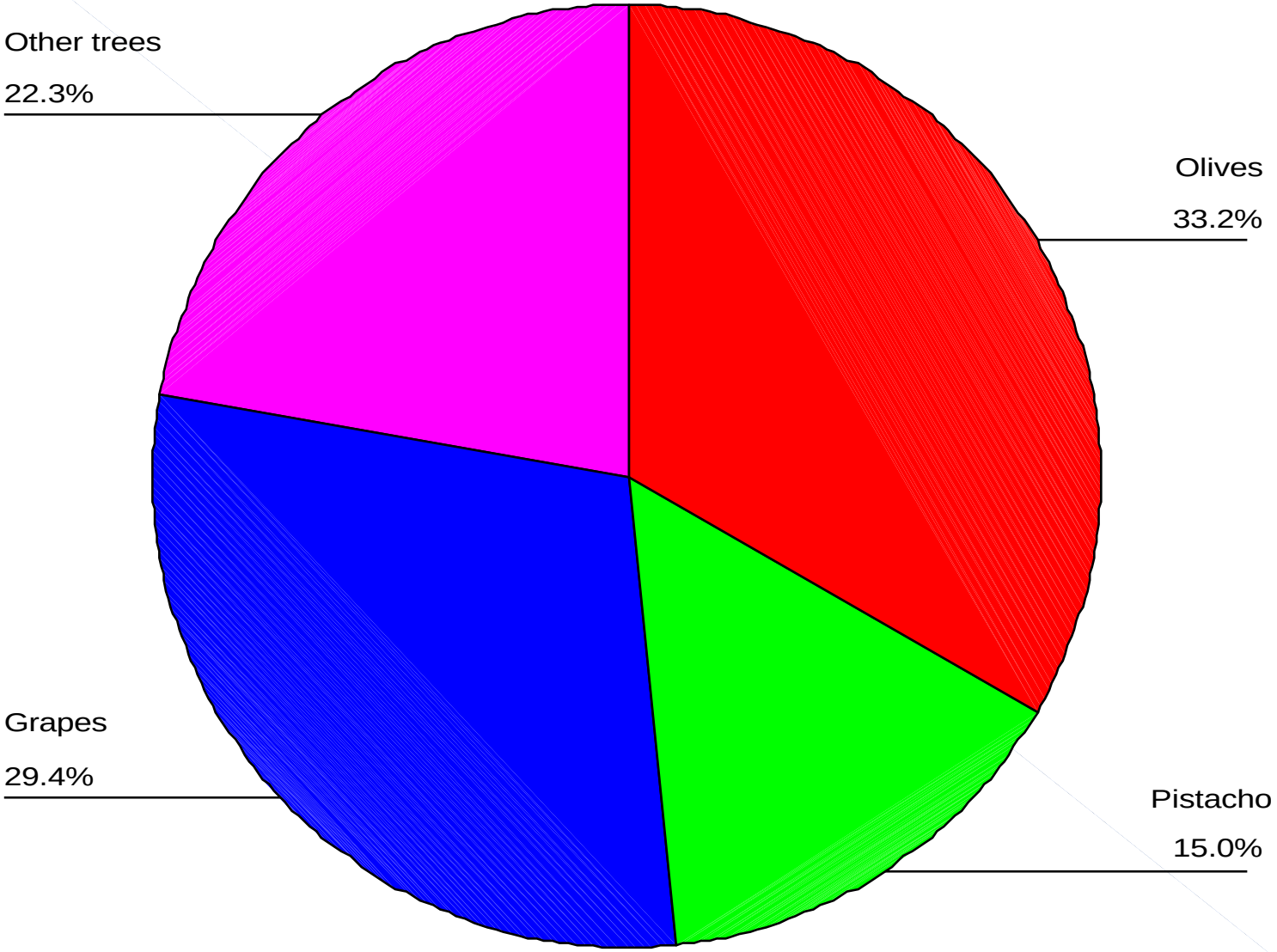


Land Use in Zone 2 in Central Area

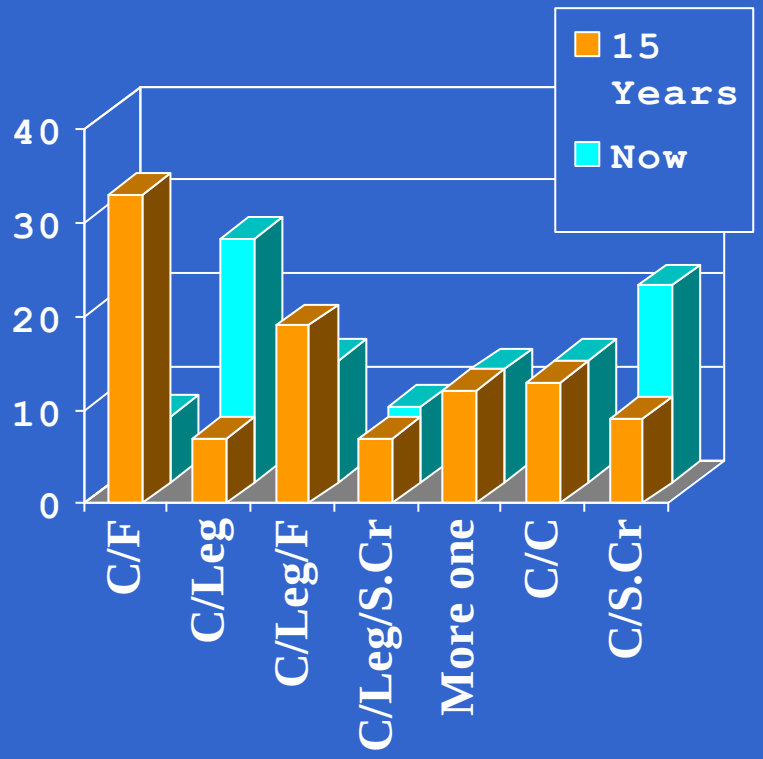



Land Use in Zone 2 in Southren Region
Fallow
24.5%
Wheat
26.4%
Trees
8.9%
Barley
10.5%
Summer crops
6.5%
Legumes
23.1%

Trees Area in Zone 2



Crop Rotations in Zone 2



Reasons reported by Farmers:

1.Irrigation	29%
2.Economic Factors	13%
3. Climate Change	9 %
4. Fertilizer use	7 %
5. Agricultural Policy	6 %

Intensification

(% of farmers)

- **Growing crops between trees 15%**
- **Growing same land more than one time per year 20%**

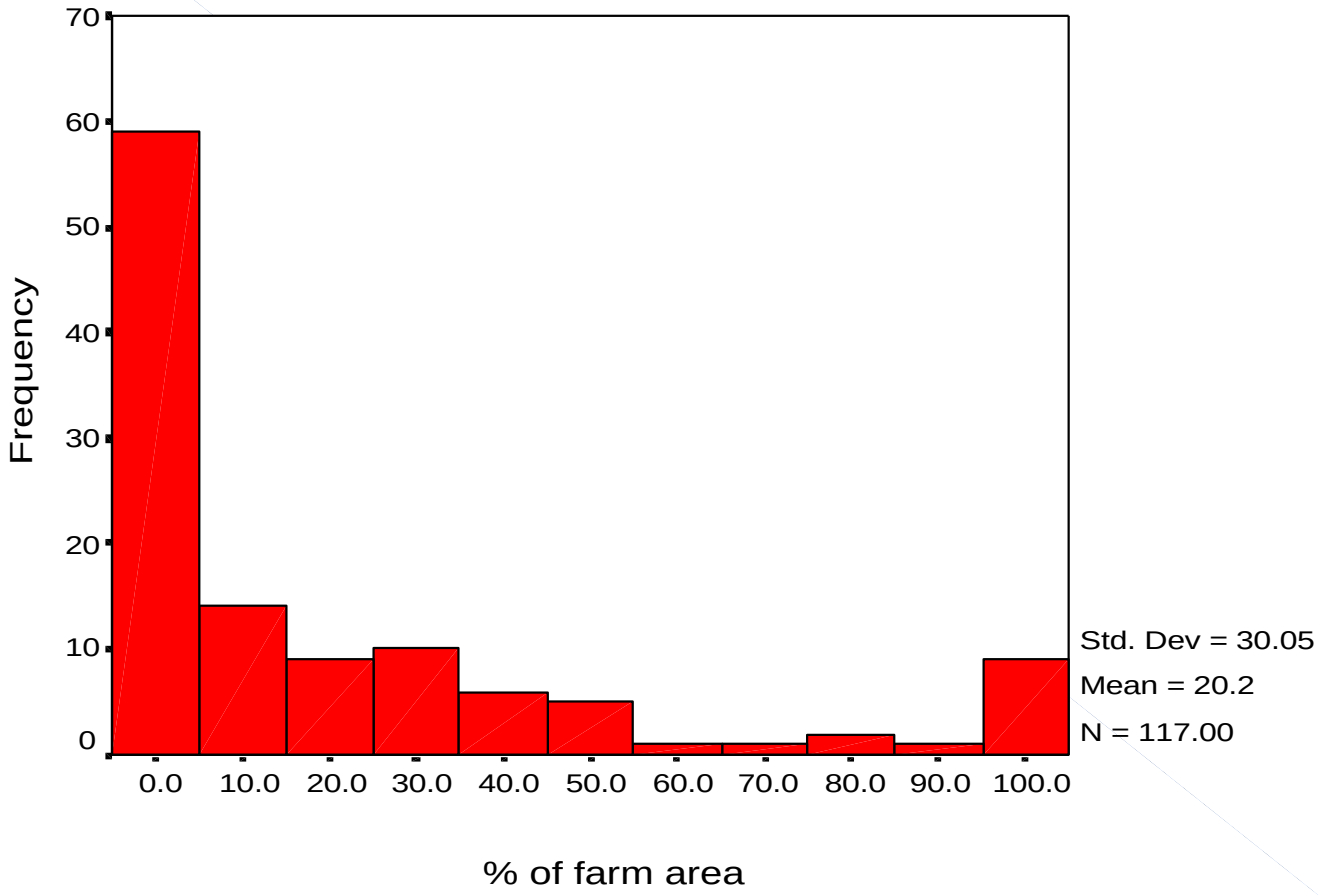
Irrigation in Zone 2

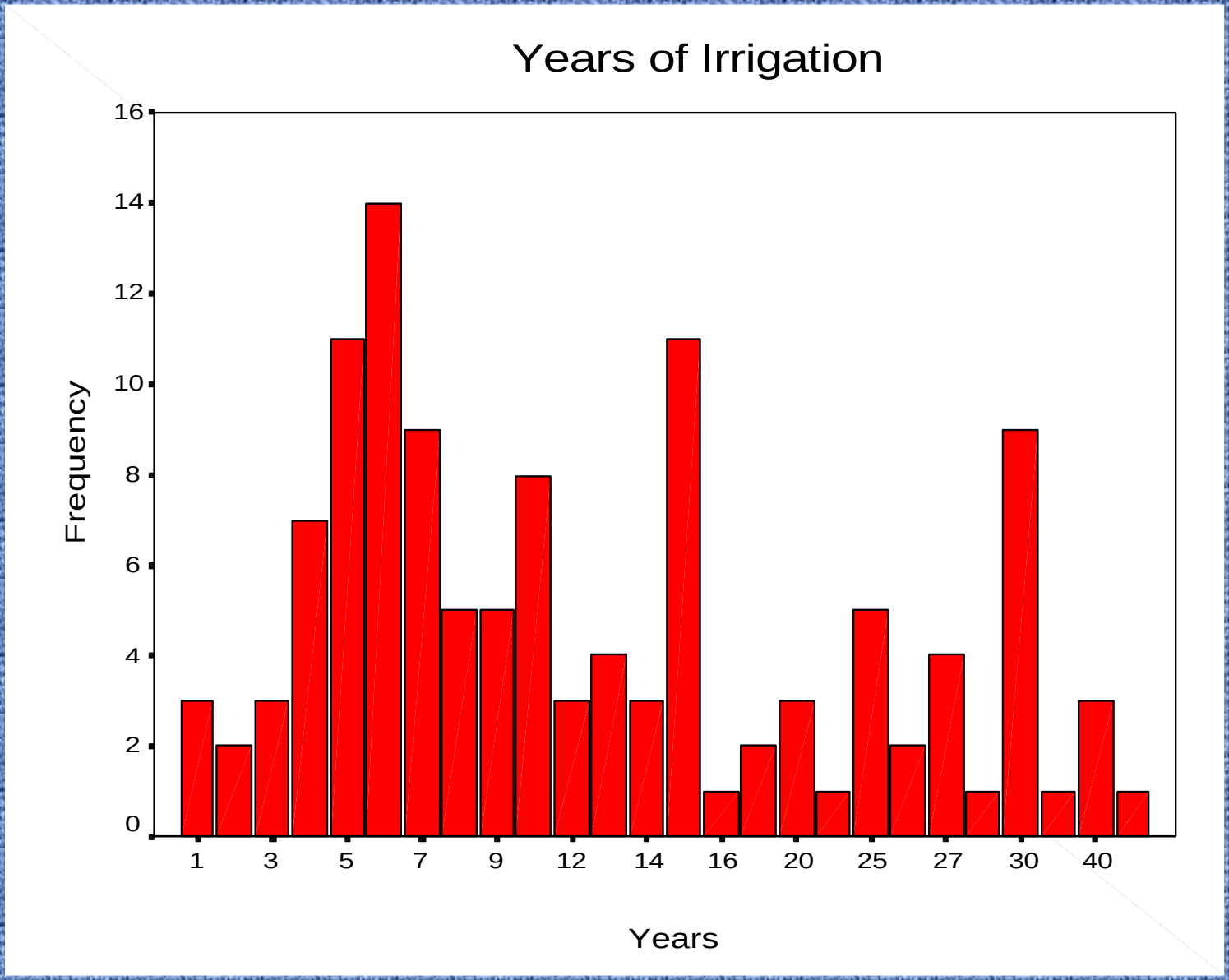
Irrigation Source and Capacity in Zone 2

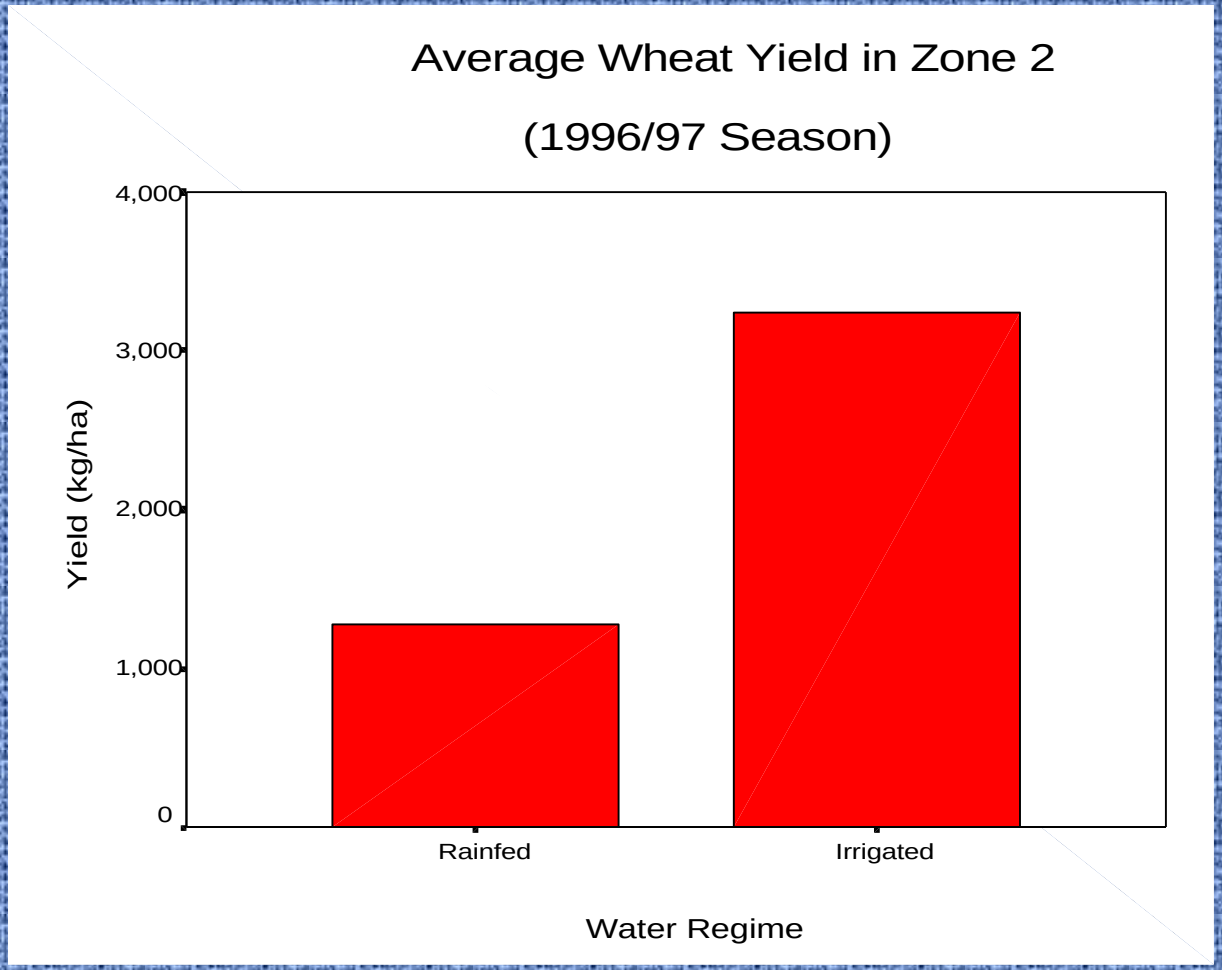
(%)

	Regions				Total
	North West	North East	South	Central	
Having Irrigation Source	41	78	23	51	47
Source of Irri.: - Wells	93	87	71	100	89
Average Water Capacity	7	18	51	24	20
New Crops Introduced	48	43	70	34	45

Farmers Distribution according to percentage of irrigated area in their farm




Years of Irrigation
Frequency
16
14
12
10
8
6
4
2
0
1
3
5
7
9
12
14
16
20
25
27
30
40
Years


Average Wheat Yield in Zone 2
(1996/97 Season)
4,000
3,000
2,000
1,000
0
Yield (kg/ha)
Rainfed
Irrigated
Water Regime

Estimation of water requirements to produce one kg of Wheat and Chickpeas in Southern Region of Syria.

Crops	Average Rainfed Yields (kg/ha)	Average Irrigated Yields (kg/ha)	Average Yields Increase Due to Irrigation (kg/ha)	Average Water Added (m3/ha)	Water Requirements to produce one kg (m3/kg)
Wheat	520	3233	2713	2354	0.87
Chickpeas	443	1267	824	2454	2.98
Vegetable	-	-	-	31550	-

Varieties, Yields, and Net Return

Percentage of farmers who use new varieties

- **Rainfed crops:**

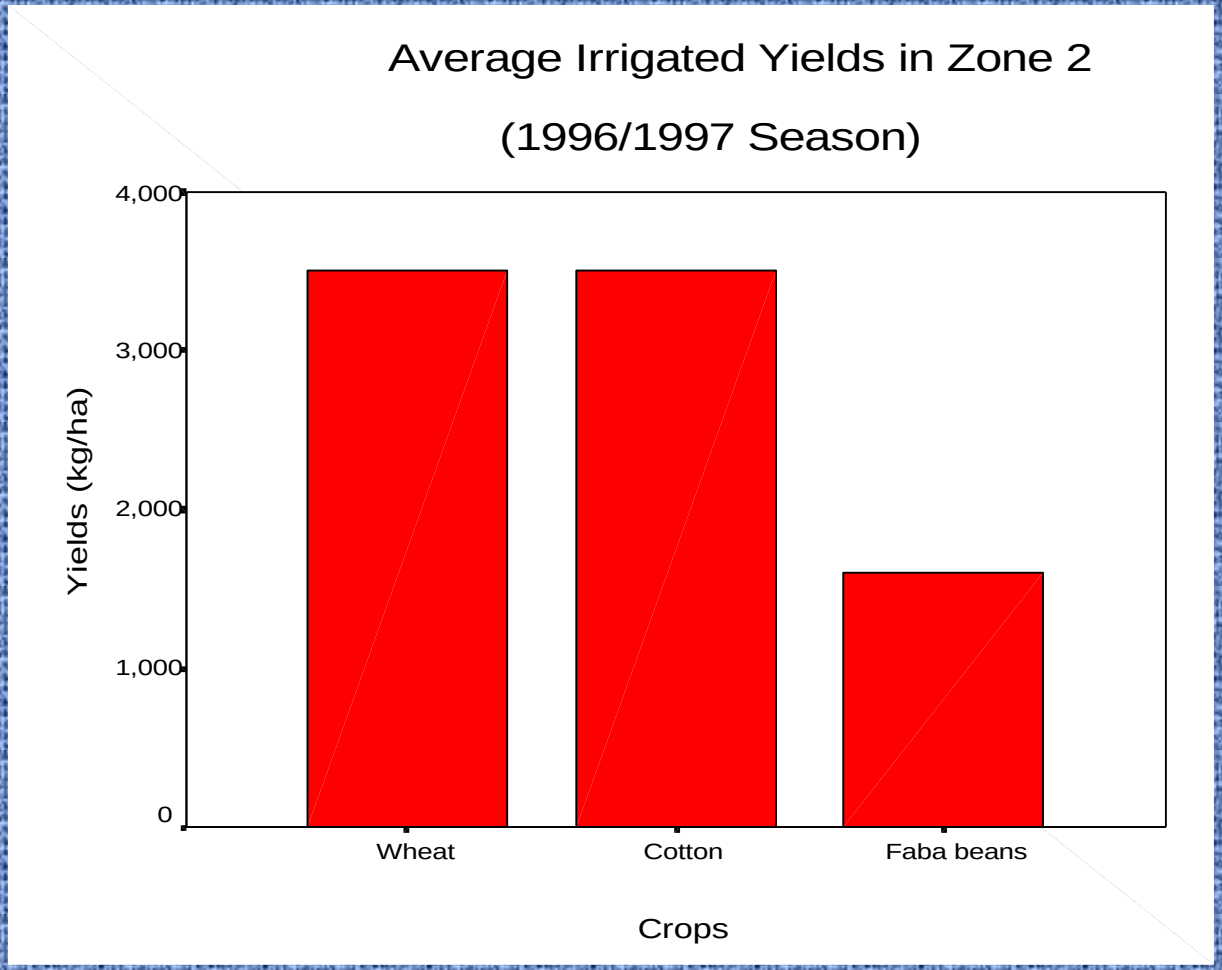
- Wheat 68%
- Barley 5%
- Chickpeas 13%
- Lentils 12%

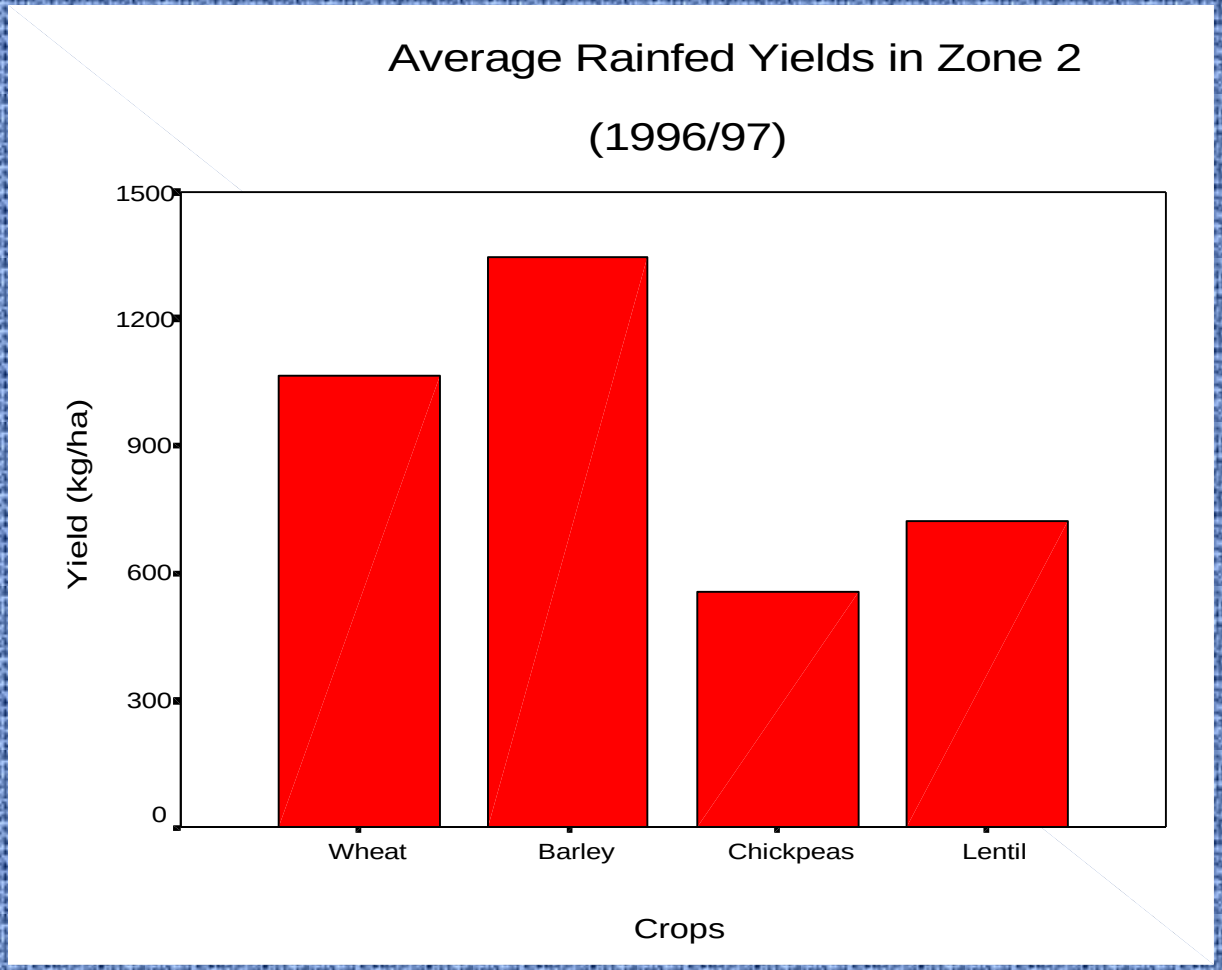
- **Irrigated crops:**

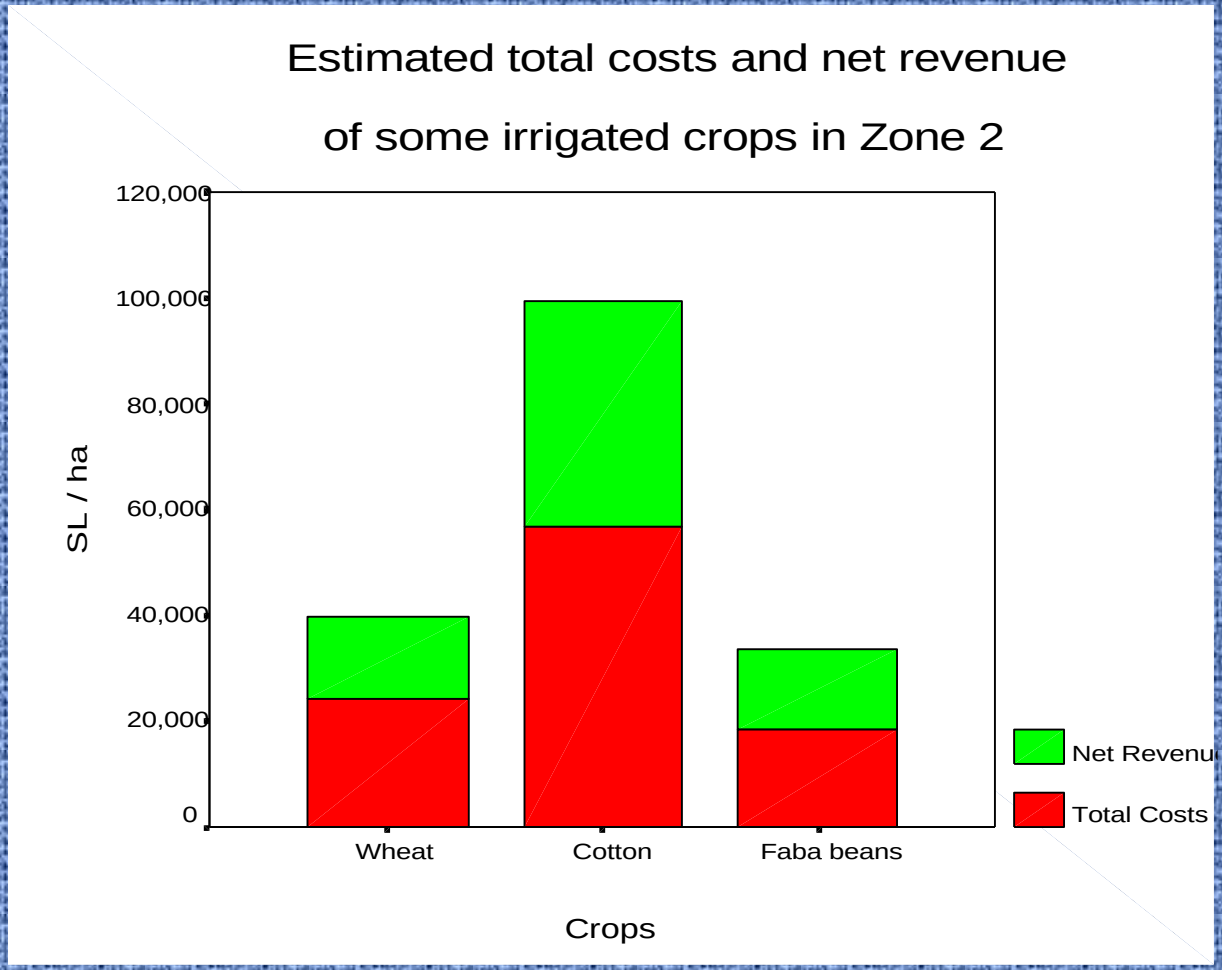
- Wheat 99%
- Cotton 100%
- Faba beans 23%
- Potatoes 100%

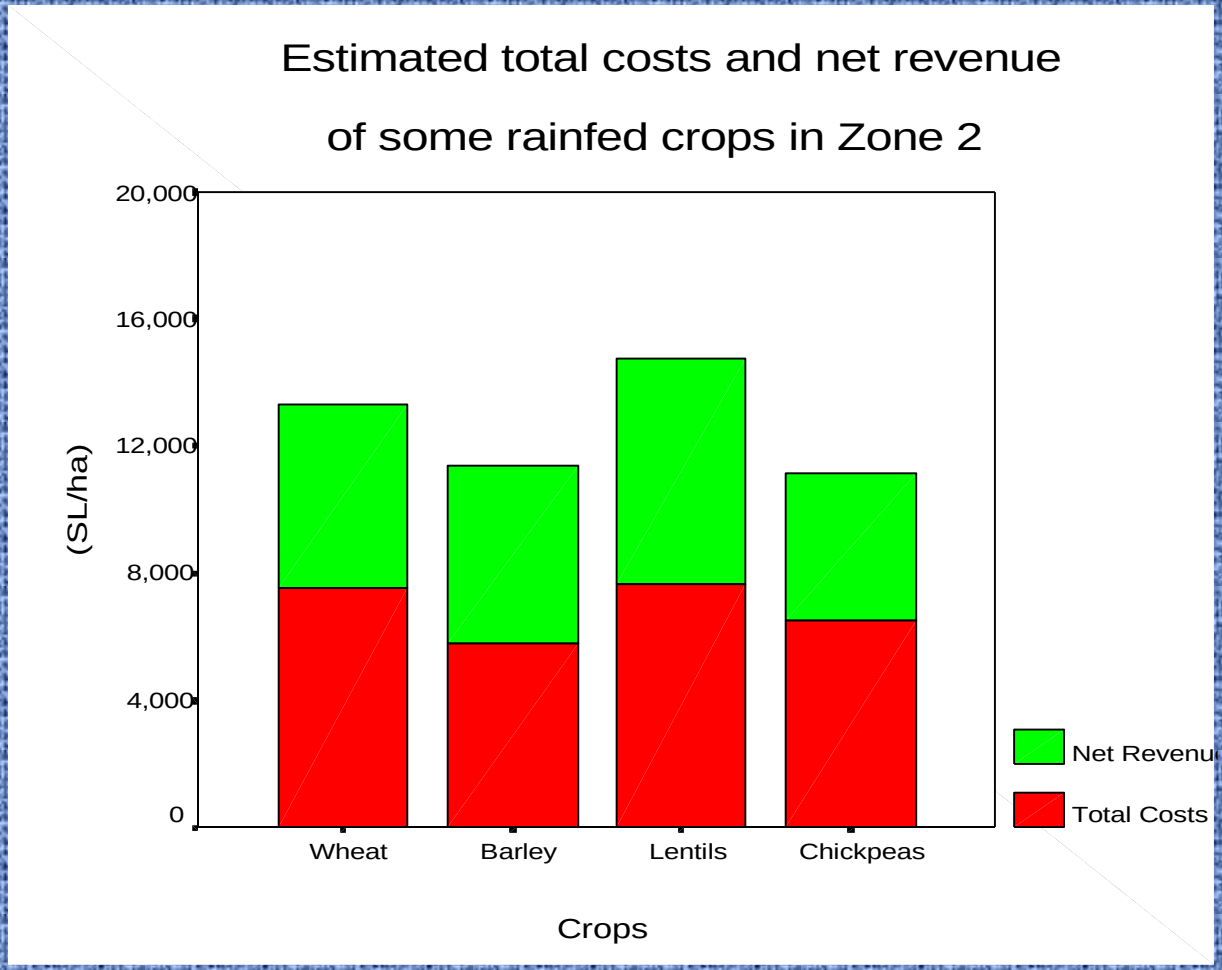
Farmers' reasons for not growing new varieties of barley (%)

- Unawareness 33.7
- Less yield 19.7
- Not suitable as feed 13.6
- High seeds price 8.9
- Seeds availability 5.9
- Other factors 18.3


Average Irrigated Yields in Zone 2
(1996/1997 Season)
Yields (kg/ha)
4,000
3,000
2,000
1,000
0
Wheat
Cotton
Faba beans
Crops


Average Rainfed Yields in Zone 2
(1996/97)
1500
1200
900
600
300
0
Yield (kg/ha)
Wheat
Barley
Chickpeas
Lentil
Crops

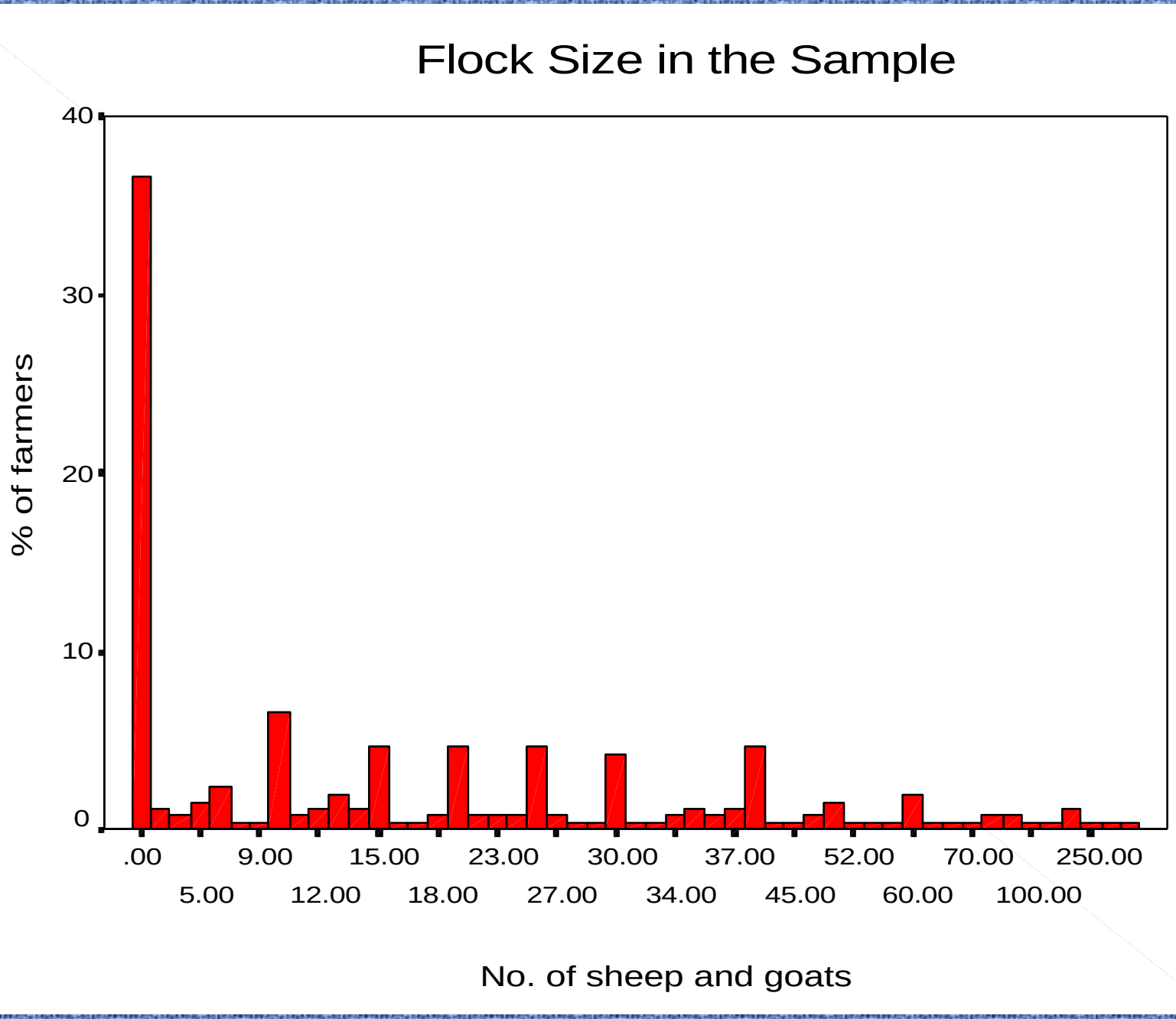

Estimated total costs and net revenue
of some irrigated crops in Zone 2
120,000
100,000
80,000
60,000
40,000
20,000
0
SL / ha
Wheat
Cotton
Faba beans
Crops
Net Revenu
Total Costs

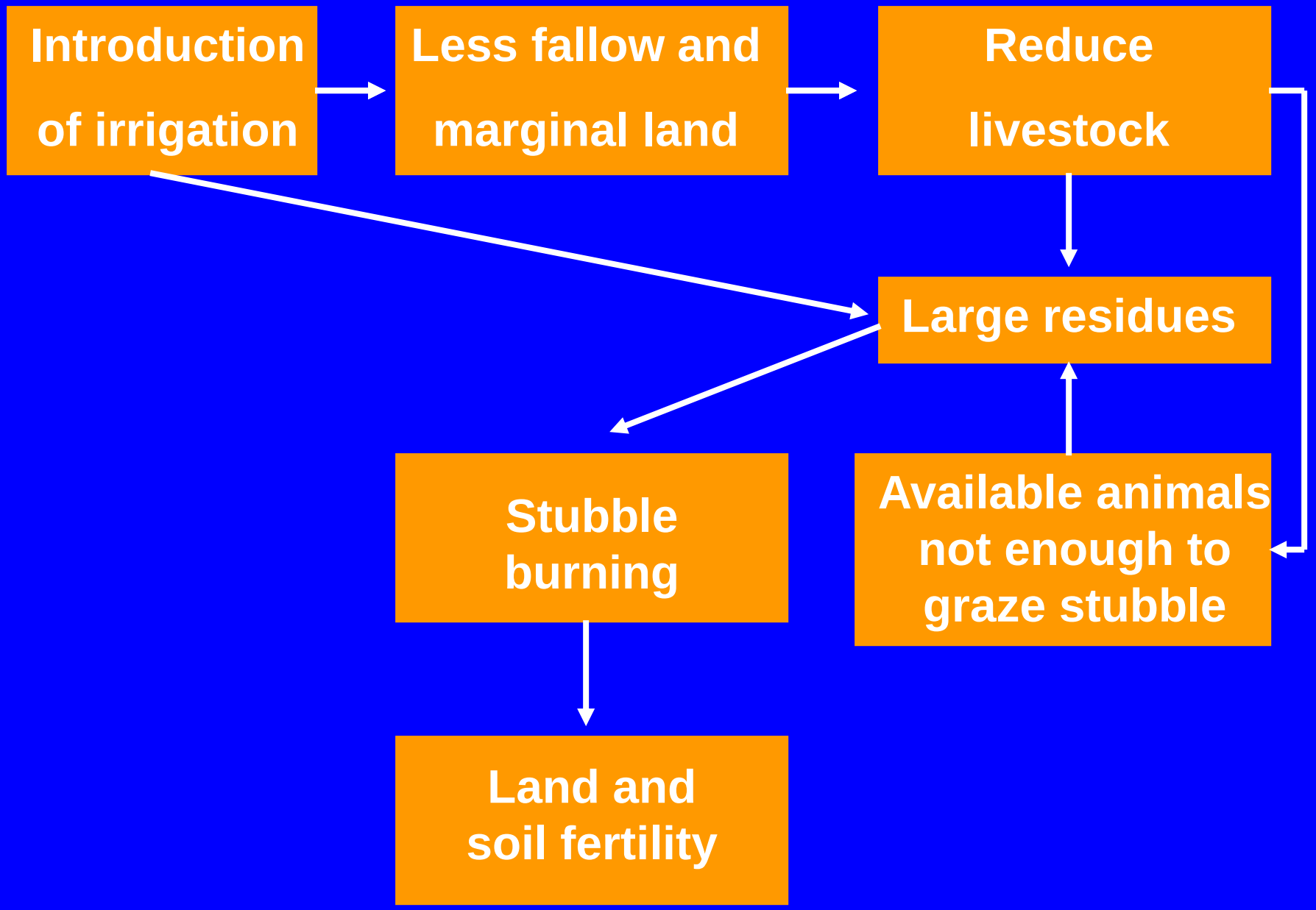

Estimated total costs and net revenue
of some rainfed crops in Zone 2
20,000
16,000
12,000
8,000
4,000
0
(SL/ha)
Wheat
Barley
Lentils
Chickpeas
Crops
Net Revenu
Total Costs


Livestock

Livestock in the sample

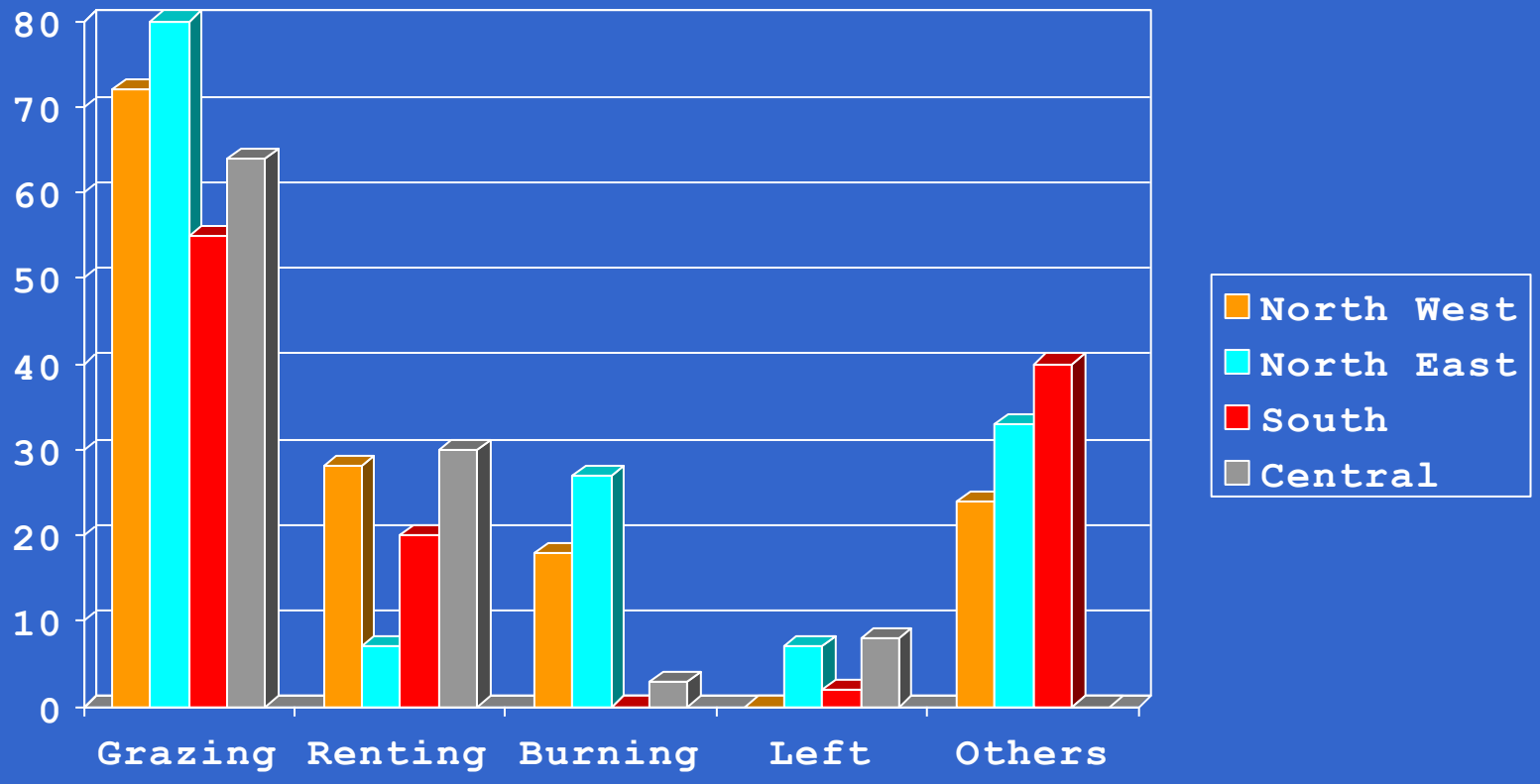
• Having Livestock in the farm	79%
• Sheep flock size changed during last 10 years	64%
• Sheep moved outside the village	24%
• Average number of sheep per household	20 head
• Average number of goats per household	2.5 head
• Average number of cattle per household	0.7 head
• Increase number of cattle	15%
• Correlation between flock and farm size	0.15*


Flock Size in the Sample
40
30
20
10
0
% of farmers
.00
5.00
9.00
12.00
15.00
18.00
23.00
27.00
30.00
34.00
37.00
45.00
52.00
60.00
70.00
100.00
250.00
No. of sheep and goats


Introduction of irrigation
Less fallow and marginal land
Reduce livestock
Large residues
Stubble burning
Available animals not enough to graze stubble
Land and soil fertility

Stubble usage

% of farmers



Conclusion and recommendation

1. The concept of wheat-based system and barley/livestock system is still valid and meaningful, but needs some modification on the light of changes occur in the farming systems.

2. The Previous farming system in Zone 2, which was characterized as a barley/livestock system has changed to become a “mixed system” of wheat-based and barley/livestock systems.

3. Livestock still has an important role in this system, but its relative importance became less compared to 20 years ago due to:

- The need to employ available family manpower in irrigated crop production does not encourage the farmer to keep a large number of animals, which also need full-time labor input.

- Introduce irrigation and tree planting has eliminated fallow and decreased the area of marginal land.

- Money and credit unavailability for farmers to be invested in irrigation, trees, and other farming inputs encouraged farmers to sell some of their livestock.

4. The changes of agricultural production system occurred in Zone 2 have influenced the natural resources management, some of these changes had a positive impact such as increasing the productivity and better usage of marginal land, but other changes such as over-use of the ground water had a negative impact.

Recommendations:

1. The changes, which took place in the farming systems in Zone 2, should be taken into account during the planning and implementation of any research in these areas, because any farming system is not static but dynamic.

2. Groundwater in Zone 2 has to be used by farmers more efficiently.

3. The farming systems evolving in the newly irrigated areas in Zone 2 need some direction, and farmers need guidance to help them to integrate cropping and livestock enterprises in sustainable way.

Thank You