Chartbook of Maize in Pakistan and AJK 1989

Chand Asghar
Jim Longmire

PARC/CIMMYT Paper 90-5

PARC/CIMMYT Collaborative Program

1990
FOREWORD

It gives me considerable pleasure to write a brief foreword for this very fine chartbook of maize in Pakistan and AJK. Maize is a crop with a lot of potential in Pakistan. It is a very important crop to many small farmers, both for its grain production and for the feed that comes from thinnings, stover and specialist green fodder crops. Much more needs to be done to make progress with this crop in Pakistan. I hope this report will encourage relevant scientists and decision makers to make the decisions and undertake the tasks that will lead to much-needed progress.

It has always concerned me that we have insufficient information on the research and development needs of crops and livestock in Pakistan. For maize, a lot of information has been lacking. Social scientists are now well-established in research systems of Pakistan. Through diagnostic studies and surveys like the one used for this report, we will be much better off in taking important decisions on research, policies and infrastructure development. I am very keen to strengthen the role of social scientists in the research process in Pakistan.

A special feature of the work behind this report was the fine collaboration between maize scientists and social scientists. Throughout this study the focus has been on obtaining information that will be useful for maize scientists, especially breeders and agronomists. Another feature of the work was the excellent collaboration that occurred between provincial scientists, those from AJK and scientists of PARC. I am very thankful to CIMMYT for helping coordinate this study, and for seeing it through to completion. It will serve as a very useful background document for the 4th Asian Regional Maize Workshop, which we are very proud to be hosting later this month.

I commend all who were involved in this particular effort. I hope that in ten years time we can undertake a similar study which will indicate considerable progress with maize. The income and food needs of our small farmers deserve every possible effort from all involved in developing the rural sectors of Pakistan and AJK.

Dr C.M. Anwar Khan
Chairman
Pakistan Agricultural Research Council

19 September 1990
ACKNOWLEDGEMENTS

Many people have contributed to this study. Individuals who helped gather data include (in order of number of farmers surveyed):

- Chand Asghar
- Umar Farooq
- Jehan Zeb
- Fazli Rabbi
- Samina Perveen
- Mohammed Nasir
- Haq Nawaz Malik
- Jehan Zeb
- Shaheen Asghar
- Ahmad Said
- Azhar Sohail
- Farooq Ahmad
- Tariq Masood
- Jim Longmire
- Nazir Hussain Shah
- M. Afzal Turk
- S. Zahoor Kazmi
- S. Sajidin Hussain
- Mohammad Bashir Butt
- Mohammad Shafiq
- Sh. Nisar
- Khushid Ahmed
- Chaudhri Munir.

In addition to these, we would like to acknowledge the exceptional efforts of the many drivers who assisted with gathering data from farmers in often very inaccessible villages.

This study would not have eventuated without the full support of others. Special thanks go to Dr C.M. Anwar Khan, Chairman, PARC, Dr Mohammad Karim, Director Agriculture, AJK, Dr Mohammad Siddique Khan, (former) Director Research, NWFP Agricultural University, Peshawar, Dr Manzoor A. Bajwa, Director General, Ayub Agricultural Research Institute, Faisalabad, Dr Agha Sajjad Haider, Member, Social Sciences, PARC, Dr Muhammad Aslam, National Maize Coordinator, NARC and Dr Derek Byerlee, Director, CIMMYT Economics Programme, Mexico.

Haroon Pervaiz, CIMMYT Office, Islamabad did an excellent job in finalising this report for publication. The contributions of statisticians Naseer Alam Khan and Inayat Khan, both of NARC, are also gratefully acknowledged.

Finally, we would like to pay special thanks to the maize farmers of Pakistan and AJK who so willingly offered information and were exceptionally hospitable.
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INTRODUCTION

This chartbook was prepared as a background document to the 4th Asian Regional Maize Workshop, 22-27 September, 1990. It summarises in chart form, the recent situation with respect to "kharif" (summer) maize in Pakistan and Azad Jammu Kashmir. The bulk of the information is drawn from a major survey of maize conducted in late 1989 and early 1990.

The survey of maize in Pakistan involved interviewing over 900 farmers in AJK, North West Frontier Province, Punjab and Islamabad Capital Territory. The major summer maize growing districts were given weights in the sample according to the area of maize in that district, against the total summer maize area in AJK and Pakistan. Villages were then randomly selected from within each sub-district (tehsil). Five farmers in these villages were surveyed, with a general strategy of finding farmers from different directions from the village centre. Two questionnaires per village were also completed on prices.

The questions in the main maize survey relate to the main sections of this chartbook. All data were coded and analysed using the SPSS statistical package and Lotus 1-2-3. The charts were all prepared using Harvard Graphics on a PS/2 IBM computer, and were printed on a Hewlett Packard LaserJet Series II printer.

We hope that this chartbook is a useful summary of the maize situation in Pakistan. The maize sector encompasses some of the more isolated and less-developed areas of Pakistan. There is considerable need for further development of these areas, including development of maize production. The maize sector has suffered from numerous constraints to progress. We hope that this chartbook will prompt interested people to take action on the highest priority problems.

Undoubtedly there is a need for a wider range of improved maize varieties and hybrids in Pakistan and Azad Kashmir. Of particular importance is shorter duration, a criteria that takes on increasing priority amongst farmers who are very keen to increase their cropping intensity. Another very high priority for development of maize is the development of an effective seed sector. As indicated in this report, the seed sector has failed to serve maize farmers satisfactorily. Other papers and reports document the need for action on this. It is pleasing to note that at the time this report goes to press the basis for an association of seed producers is taking shape. Much work also needs to be undertaken on agronomic aspects of maize production, especially in its dual-purpose role as a fodder and grain crop.
Overview
Maize Production Areas of Pakistan
Maize Area and Production by Province, 1988-89

Maize Area ('000 ha)
- Punjab: 345
- Baluchistan: 5
- NWFP: 495
- Sind: 20

Maize Production ('000 t)
- Punjab: 455
- Baluchistan: 4
- NWFP: 735
- Sind: 10

Maize Area and Production by Province, 1988-89
Maize Area in Pakistan from 1970-71 to 1988-89

Maize Yield in Pakistan 1970-71 to 1988-89
Maize Area by Province
1970-71 to 1988-89

NWFP

Punjab
Maize Varieties
Share of Maize Area Planted to Improved Varieties, By Region, 1989

Percent

AJK: 9%
NWFP: 17%
Punjab: 55%
Overall: 26%
Share of Maize Area Planted to Improved Varieties, by Ecology

- Irrigated Plains: 48%
- Rainfed Plateaus: 1.4%
- Mountain Valleys: 24%
- Mountain Terraces: 8%
Area Planted to Improved Maize in 1989 by Decade of Release, by Region

Percent of Total Maize Area

AJK
- Before 1970: 8.5%
- During 70s: 4%
- During 80s: 5%
- Hybrids: 8%

NWFP
- Before 1970: 8%
- During 70s: 5%
- During 80s: 8%
- Hybrids: 4%

Punjab
- Before 1970: 6%
- During 70s: 38%
- During 80s: 6%
- Hybrids: 3%

Overall
- Before 1970: 5%
- During 70s: 15%
- During 80s: 5%
- Hybrids: 5%
Area Planted to Improved Maize in 1989 by Decade of Release, by Ecology

Percent of Total Maize Area

<table>
<thead>
<tr>
<th>Ecology</th>
<th>Percent of Total Maize Area</th>
</tr>
</thead>
</table>
| Irrigated Plains | Before 1970: 5%  
                                      During 70s: 32%  
                                      During 80s: 7%  
                                      Hybrids: 5% |
| Rainfed Plateaus | Before 1970: 5%  
                                      During 70s: 9%  
                                      During 80s: 9%  
                                      Hybrids: 1% |
| Mountain Valleys | Before 1970: 6%  
                                      During 70s: 9%  
                                      During 80s: 9%  
                                      Hybrids: 1% |
| Mountain Terraces| Before 1970: 1%  
                                      During 70s: 5%  
                                      During 80s: 5%  
                                      Hybrids: 1% |
Most Common Improved Varieties
in Pakistan and AJK, by Area, 1989

- Neelum: 39%
- Azam: 13%
- Improved, Name Unknown by Farmers: 15%
- J-1: 6%
- Akbar: 6%
- Sarhad White: 7%
- Hybrids: 10%
- Shaheen: 1%
- Kashmir Gold: 1%
- Sultan: 4%
Most Common Improved Varieties in Punjab, by Area, 1989

- Neelum: 57%
- Improved, Name Unknown by Farmers: 11%
- Akbar: 8%
- Sultan: 6%
- Hybrids: 14%
- J-1: 8%
Most Common Improved Varieties in NWFP, by Area, 1989

- Azam: 36%
- Sarhad White: 7%
- Shaheen: 0.3%
- J-1: 0.4%
- Improved, Name Unknown by Farmers: 56%
Color of Maize Grain

Improved Varieties

- White: 37.1%
- Mixed: 4.6%
- Yellow: 58.3%

Local Varieties

- White: 73.8%
- Mixed: 7.2%
- Yellow: 19%
Hardness of Maize Grain

<table>
<thead>
<tr>
<th>Variety</th>
<th>Semi-hard</th>
<th>Soft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved</td>
<td>34.1%</td>
<td>8.9%</td>
</tr>
<tr>
<td>Local</td>
<td>22.1%</td>
<td>15%</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Hardness Level</th>
<th>Improved</th>
<th>Local</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-hard</td>
<td>57%</td>
<td>22.1%</td>
</tr>
<tr>
<td>Hard</td>
<td>62.9%</td>
<td>62.9%</td>
</tr>
</tbody>
</table>
Average Duration of Maize, Local and Improved, by Region, 1989

Days

AJK  |  NWFP  |  Punjab (Grain)  |  Punjab (Fodder)
---   |---   |---               |---
146  | 133  | 101  107         | 82  67

Local  |  Improved
---   |---
Average Duration of Maize, Local and Improved, by Ecology, 1989
Average Duration of Maize, Local and Improved, by Altitude, 1989

Days

Altitude (m.a.s.l.)

<table>
<thead>
<tr>
<th>Altitude Range</th>
<th>Local</th>
<th>Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-500</td>
<td>88</td>
<td>92</td>
</tr>
<tr>
<td>500-1000</td>
<td>98</td>
<td>102</td>
</tr>
<tr>
<td>1000-1500</td>
<td>122</td>
<td>116</td>
</tr>
<tr>
<td>&gt;1500</td>
<td>138</td>
<td>139</td>
</tr>
</tbody>
</table>
Maize Seed
Average Seed Rate of Maize by Ecology, 1989

Kg/ha

Irrigated Plains: Local 45, Improved 34
Rainfed Plateaus: Local 62
Mountain Valleys: Local 76, Improved 57
Mountain Terraces: Local 81, Improved 75
Average Seed Rate of Maize by Province, 1989

Kg/ha

AJK  69  52
NWFP 72  64
Punjab 57  33
Overall 69  48

Local  Improved

21
Average Seed Rate of Maize Fodder, 1989

NWFP

87

Punjab

74

74

Overall

78

75

Kg/ha

Local

Improved
Number of Crop Cycles with Seed of Improved Maize Grown in 1989

Crop Cycle

Percent

0 5 10 15 20 25 30

1 2 3 4 5 6 7-12

28% 15% 22% 10% 9% 8% 7.7%
Source of Maize Seed Planted, 1989

Percent

- Local
- Improved

<table>
<thead>
<tr>
<th>Source</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>Own</td>
<td>83%</td>
</tr>
<tr>
<td>Other Farmers</td>
<td>7%</td>
</tr>
<tr>
<td>Shop Keepers</td>
<td>9%</td>
</tr>
<tr>
<td>Research &amp; Extension &amp; Seed Depots</td>
<td>16%</td>
</tr>
</tbody>
</table>
Number of Crop Cycles with Local Maize Seed Selected on the Farm

Percent

<table>
<thead>
<tr>
<th>Crop Cycles</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>31%</td>
</tr>
<tr>
<td>6-10</td>
<td>16%</td>
</tr>
<tr>
<td>11-20</td>
<td>23%</td>
</tr>
<tr>
<td>21-30</td>
<td>16%</td>
</tr>
<tr>
<td>More than 30</td>
<td>14%</td>
</tr>
</tbody>
</table>
Original Source of Maize Seed, Local and Improved Varieties

Percent

- Local
- Improved

<table>
<thead>
<tr>
<th>Source</th>
<th>Local</th>
<th>Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>Other Farmers</td>
<td>56%</td>
<td>25%</td>
</tr>
<tr>
<td>Shop Keepers</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Research &amp; Extension &amp; Seed Depots</td>
<td>2%</td>
<td>1%</td>
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Method of Selecting Maize Seed Retained By Farmers

Percent

<table>
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<tr>
<th></th>
<th>Local</th>
<th>Improved</th>
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<tbody>
<tr>
<td>In field</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Before shelling</td>
<td>81%</td>
<td>88%</td>
</tr>
<tr>
<td>After shelling</td>
<td>18%</td>
<td>12%</td>
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</table>
Average Price of Maize Seed
Quoted by Farmers, 1989

Rs/kg

AJK  NWFP  Punjab  Overall

Local  Improved

28
Seed to Grain Price Ratio of Maize, 1989

Maize Seed
- Local
- Improved

AJK
NWFP
Punjab
Overall

Ratio

1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
Seed to Grain Price Ratio
of Wheat, 1989

<table>
<thead>
<tr>
<th>Area</th>
<th>Local</th>
<th>Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJK</td>
<td>2.0</td>
<td>1.4</td>
</tr>
<tr>
<td>NWFP</td>
<td>1.03</td>
<td>1.23</td>
</tr>
<tr>
<td>Punjab</td>
<td>1.17</td>
<td>1.4</td>
</tr>
<tr>
<td>Overall</td>
<td>1.25</td>
<td>1.3</td>
</tr>
</tbody>
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Cropping Patterns and Timing
1988-89 Rabi Crops Preceding Maize, by Ecology

- Irrigated Plains
- Rainfed Plateaus
- Mountain Valleys
- Mountain Terraces

- Wheat Grain
- Other Fodder
- Wheat Fodder
- Sugarcane & Tobacco
- Fallow
- Vegetables & Other
Previous Kharif Crop in Maize Field, by Ecology

- Maize Grain
- Other Fodder
- Maize Fodder
- Sugarcane & Tobacco
- Vegetables & Other
- Fallow
Indices of Cropping Intensity, Kharif, Rabi and Overall, by Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Kharif (Summer)</th>
<th>Rabi (Winter)</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJK</td>
<td>94%</td>
<td>54%</td>
<td></td>
</tr>
<tr>
<td>NWFP</td>
<td>148%</td>
<td>87%</td>
<td>171%</td>
</tr>
<tr>
<td>Punjab</td>
<td>87%</td>
<td>76%</td>
<td>84%</td>
</tr>
<tr>
<td>Overall</td>
<td>164%</td>
<td>80%</td>
<td>180%</td>
</tr>
</tbody>
</table>
Indices of Cropping Intensity, Kharif, Rabi and Overall, by Ecology
Indices of Cropping Intensity, Kharif, Rabi and Overall, by Altitude

![Bar chart showing indices of cropping intensity by altitude for Kharif (Summer), Rabi (Winter), and Overall.]
Average Dates of First Ploughing, Planting and Harvesting for Maize, 1989

- Growing Period
- Land Preparation Period

Grain
Fodder

Punjab
NWFP
AJK

1st Ploughing
Planting
Harvesting

Apr May Jun Jul Aug Sep Oct Nov

Months
Average Dates of First Ploughing, Planting and Harvesting for Maize, by Ecology, 1989

Growing Period

Land Preparation Period

Grain

Fodder

Irrigated Plains

Rainfed Plateaus

Mountain Valleys

Mountain Terraces

1st Ploughing

Planting

Harvesting

Apr May Jun Jul Aug Sep Oct Nov

Months
Average Days from First Ploughing to Planting, Local and Improved Maize
Key Inputs and Technologies
Share of Maize Area Planted Which is Irrigated, by Region, 1989

Percent

100

80

60

40

20

0

AJK

NWFP

Punjab

Overall

84%

53%

45%

10%
Share of Maize Area Planted Which is Irrigated, by Ecology, 1989

- **Irrigated Plains**: 100%
- **Rainfed Plateaus**: 8%
- **Mountain Valleys**: 32%
- **Mountain Terraces**: 19%
Percentage of Maize Fields by History of Manuring, by Ecology, 1989

- Irrigated Plains: 81% Manured Regularly, 19% Unmanured or Occasionally Manured
- Rainfed Plateaus: 89% Manured Regularly, 11% Unmanured or Occasionally Manured
- Mountain Valleys: 88% Manured Regularly, 12% Unmanured or Occasionally Manured
- Mountain Terraces: 88% Manured Regularly, 12% Unmanured or Occasionally Manured
Average Number of Ploughings for Maize, by Ecology

- Irrigated Plains: 6
- Rainfed Plateaus: 5
- Mountain Valleys: 4
- Mountain Terraces: 3
Tractor Ploughings as a Share of Total Ploughings, by Ecology

Percent

Irrigated Plains | Rainfed Plateaus | Mountain Valleys | Mountain Terraces
Method of Planting Practiced by Maize Farmers by Region, 1989

Note: "Kera" is planting by hand in furrows made by a plough.
"Pora" is the same, but using a tube for placing the seed.
Average Total Nutrient Application of Fertilizer on Maize, by Region, 1989

Kg/ha

<table>
<thead>
<tr>
<th>Region</th>
<th>Nitrogen</th>
<th>Phosphate</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJK</td>
<td>39</td>
<td>2</td>
</tr>
<tr>
<td>NWFP</td>
<td>74</td>
<td>12</td>
</tr>
<tr>
<td>Punjab</td>
<td>63</td>
<td>25</td>
</tr>
<tr>
<td>Overall</td>
<td>66</td>
<td>14</td>
</tr>
</tbody>
</table>
Average Total Nutrient Application of Fertilizer on Maize, by Ecology, 1989

Kg/ha

<table>
<thead>
<tr>
<th>Ecology</th>
<th>Nutrient Application</th>
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</thead>
<tbody>
<tr>
<td>Irrigated Plains</td>
<td>74</td>
</tr>
<tr>
<td>Rainfed Plateaus</td>
<td>53</td>
</tr>
<tr>
<td>Mountain Valleys</td>
<td>67</td>
</tr>
<tr>
<td>Mountain Terraces</td>
<td>58</td>
</tr>
</tbody>
</table>

- Nitrogen
- Phosphate
Average Nitrogen Applied to Maize, Local and Improved, 1989

Kg/ha

AJK  NWFP  Punjab  Overall

Local  Improved
Average Phosphate Applied to Maize, Local and Improved, 1989

Kg/ha

AJK | NWFP | Punjab | Overall

Local | Improved

0 | 5 | 10 | 15 | 20 | 25 | 30

Overall

50
Percentage of Total Fertilizer Applied in the Basal Dose on Maize, 1989

[Bar chart showing the percentage of total fertilizer applied in the basal dose on maize, differentiated by region (AJK, NWFP, Punjab, Overall) and fertilizer type (Nitrogen, Phosphate).]
Percentage of Total Nutrients Applied Coming from Chemical Fertilizer

- AJK: 58% Nitrogen, 6% Phosphate
- NWFP: 75% Nitrogen, 18% Phosphate
- Punjab: 66% Nitrogen, 40% Phosphate
- Overall: 70% Nitrogen, 22% Phosphate
Average Application of Farm Yard Manure on Maize, 1989

- NWFP
- Punjab
- Overall

The diagram shows the average application of farm yard manure (t/ha) for different regions and the overall average.
Percentage of Maize Fields Manually Hoed after Planting, 1989

- Hoed
- Not hoed

AJK
NWFP
Punjab
Overall
Percentage of Maize Fields Seen, 1989

Note: Seeling is tractor/bullock ploughing 3-4 Weeks after planting to thin the crop
Frequency of Number of Irrigations
Overall to Irrigated Maize Fields

Percent

Number of Irrigations

0-2
3-5
6-8
9-12
13 plus
Shares of Mechanical and Manual Shelling of Maize, by Region, 1989

Percent

AJK  |  NWFP  |  Punjab  |  Overall
---|---|---|---
7% | 41% | 26% | 32%
93% | 59% | 74% | 68%
Maize Yields
Average Maize Yield, 1989

By Region

By Ecology
Distribution of Maize Yields, by Region

AJK

Percent of Fields

30

25

20

15

10

5

0

Grain Yield (t/ha)

NWFP

Percent of Fields

30

26

20

15

10

6

0

Grain Yield (t/ha)

Punjab

Percent of Fields

30

25

20

15

10

6

0

Grain Yield (t/ha)

Overall

Percent of Fields

30

25

20

15

10

6

0

Grain Yield (t/ha)
Average Maize Yield, Local and Improved, by Region, 1989

AJK NWFP Punjab Overall

0 0.5 1 1.5 2 2.5 3

0 1 1.5 2 2.5 3

AJK NWFP Punjab Overall

Local Improved

1.5 1.3 1.9 2.6 1.3
Average Maize Yield, Local and Improved, by Ecology, 1989

<table>
<thead>
<tr>
<th></th>
<th>Local</th>
<th>Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigated Plains</td>
<td>1.6</td>
<td>2.5</td>
</tr>
<tr>
<td>Rainfed Plateaus</td>
<td>1.19</td>
<td>1.17</td>
</tr>
<tr>
<td>Mountain Valleys</td>
<td>1.16</td>
<td>1.4</td>
</tr>
<tr>
<td>Mountain Terraces</td>
<td>1.27</td>
<td>2.1</td>
</tr>
</tbody>
</table>
Average Maize Yield, Local and Improved, by Altitude, 1989

![Graph showing average maize yield by altitude range for local and improved varieties in 1989.](image-url)
Average Wheat Yield, 1988-89

t/ha

AJK  NWFP  Punjab  Overall

0.8  1.5  2.4  1.7
Average Yields, Maize and Wheat, by Ecology, 1989

Irrigated Plains: Maize 2.6, Wheat 1.9
Rainfed Plateaus: Maize 1.2, Wheat 1.4
Mountain Valleys: Maize 1.2, Wheat 1.1
Mountain Terraces: Maize 1.35, Wheat 1.17
Livestock and Fodder
Use of Maize
Average Number of Animal Units per Farm, 1989

Animal Units

<table>
<thead>
<tr>
<th></th>
<th>AJK</th>
<th>NWFP</th>
<th>Punjab</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Average Number of Animal Units per Farm, 1989
Average Number of Livestock per Hectare, 1989

Animal Units/ha

<table>
<thead>
<tr>
<th></th>
<th>AJK</th>
<th>NWFP</th>
<th>Punjab</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Units/ha</td>
<td>8.2</td>
<td>5.6</td>
<td>4</td>
<td>5.4</td>
</tr>
</tbody>
</table>
Buffaloes as a Share of Total Animal Units, by Region, 1989

Percent

AJK | NWFP | Punjab | Overall
--- | --- | --- | ---

Buffalo | Other Animals
--- | ---

0 | 100
20 | 80
40 | 60
60 | 40
80 | 20
100 | 0
Share of Maize Area Cut Fully for Green Fodder, 1989

Percent

0.5% 4% 46% 17%

AJK NWFP Punjab Overall
Share of Maize Area Thinned, 1989

Percent

AJK  NWFP  Punjab  Overall

0  20  40  60  80  100
Share of Maize Area Thinned, by Ecology, 1989
Number of Days Feeding Livestock with Maize Fodder and Stover, 1989

Days

AJK | NWFP | Punjab | Overall

Thinnings | Green fodder | Dry stover

Days

140
120
100
80
60
40
20
0

73
Number of Days Feeding Livestock with Maize Fodders, by Ecology

120
100
80
60
40
20
0

Days

Irrigated Plains
Rainfed Plateaus
Mountain Valleys
Mountain Terraces

Thinnings
Green fodder
Dry stover

74
Prices
Average Price of Maize Grain Quoted by Farmers, 1989

Rs/Kg

Maize Grain

Before harvest  After harvest
Average Price of Wheat Grain
Quoted by Farmers, 1989

Rs/Kg

AJK | NWFP | Punjab | Overall
---|------|--------|-------
0.5 | 2.5  | 2.0    | 2.5
1   | 3    | 3      | 3
1.5 | 3.5  | 3.0    | 3.5
3   | 3.5  | 3.0    | 3.5
3.5 | 3.5  | 3.0    | 3.5

Wheat Grain
- Before harvest
- After harvest

77
Average Price of Wheat Straw Quoted by Farmers, 1989

<table>
<thead>
<tr>
<th>Region</th>
<th>Before Harvest</th>
<th>After Harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJK</td>
<td>1.25</td>
<td>0.50</td>
</tr>
<tr>
<td>NWFP</td>
<td>1.00</td>
<td>0.60</td>
</tr>
<tr>
<td>Punjab</td>
<td>0.80</td>
<td>0.45</td>
</tr>
<tr>
<td>Overall</td>
<td>1.00</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Wheat Straw
- Before harvest
- After harvest
Average Price of Maize Green Fodder Quoted by Farmers

'000 Rs/ha

AJK
NWFP
Punjab
Overall
Average Price of Berseem
Quoted by Farmers, 1989

\[ '000 \text{ Rs/ha} \]

\begin{figure}
\centering
\includegraphics[width=\textwidth]{chart.png}
\caption{Average Price of Berseem Quoted by Farmers, 1989}
\end{figure}
Average Price of Maize Dry Stover
Quoted by Farmers, 1989

'000 Rs/ha

AJK
NWFP
Punjab
Overall
Maize Utilization
Consumption Per Head of Maize and Wheat Grain

By Ecology

Kg/hd

By Province

Kg/hd

<table>
<thead>
<tr>
<th>Ecology</th>
<th>Maize Grain</th>
<th>Wheat Grain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigated Plains</td>
<td>62</td>
<td>60</td>
</tr>
<tr>
<td>Rainfed Plateaus</td>
<td>157</td>
<td>69</td>
</tr>
<tr>
<td>Mountain Valleys</td>
<td>77</td>
<td>118</td>
</tr>
<tr>
<td>Mountain Terraces</td>
<td>90</td>
<td>128</td>
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</table>

<table>
<thead>
<tr>
<th>Province</th>
<th>Maize Grain</th>
<th>Wheat Grain</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJK</td>
<td>72</td>
<td>133</td>
</tr>
<tr>
<td>NWFP</td>
<td>65</td>
<td>113</td>
</tr>
<tr>
<td>Punjab</td>
<td>67</td>
<td>140</td>
</tr>
<tr>
<td>Overall</td>
<td>70</td>
<td>132</td>
</tr>
</tbody>
</table>
Average Maize Production, Sales and Purchases per Farm, 1988
Average Maize Production, Sales and Purchases per Farm, by Ecology

Kgs

Production  Sales  Purchases

Irrigated Plains  Rainfed Plateaus  Mountain Valleys  Mountain Terraces
Grain Surplus Per Head, by Ecology

**Irrigated Plains**

- Farm Size: 1 Ha, 1-2 Ha, 2-4 Ha, >4 Ha
- Crops: Maize, Wheat

**Rainfed Plateaus**

- Farm Size: 1 Ha, 1-2 Ha, 2-4 Ha, >4 Ha
- Crops: Maize, Wheat

**Mountain Valleys**

- Farm Size: 1 Ha, 1-2 Ha, 2-4 Ha, >4 Ha
- Crops: Maize, Wheat

**Mountain Terraces**

- Farm Size: 1 Ha, 1-2 Ha, 2-4 Ha, >4 Ha
- Crops: Maize, Wheat
Grain Surplus Per Head, by Region

AJK

NWFP

Punjab

Pakistan and AJK Overall
Maize Farm Characteristics:
Results of 1989 Maize Survey
Average Farm Size and Maize Area Planted 1989, by Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Farm Size</th>
<th>Maize Area</th>
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</thead>
<tbody>
<tr>
<td>AJK</td>
<td>1.3 ha</td>
<td>1.0</td>
</tr>
<tr>
<td>NWFP</td>
<td>2 ha</td>
<td>1.1</td>
</tr>
<tr>
<td>Punjab</td>
<td>5.3 ha</td>
<td>1.2</td>
</tr>
<tr>
<td>Overall</td>
<td>3 ha</td>
<td>1.1</td>
</tr>
</tbody>
</table>
Average Farm Size and Maize Area Planted 1989, by Ecology

- **Irrigated Plains**: 5.0 ha
  - Farm Size: 4.0 ha
  - Maize Area: 1.0 ha
- **Rainfed Plateaus**: 2.6 ha
  - Farm Size: 0.8 ha
  - Maize Area: 1.8 ha
- **Mountain Valleys**: 2.0 ha
  - Farm Size: 1.3 ha
  - Maize Area: 0.7 ha
- **Mountain Terraces**: 1.4 ha
  - Farm Size: 1.0 ha
  - Maize Area: 0.4 ha
Percentage of Maize Farmers by Farm Size Groups, 1989

Percentage of Farmers

- <1 Ha: 39%
- 1-2 Ha: 21%
- 2-4 Ha: 23%
- >4 Ha: 17%

Total Cultivated Area
Farm Size and Total Maize Area by 10% Frequency Intervals, 1989
Average Size of Joint Family on Maize Farms, 1989

Family Members

- AjK
- NWFP
- Punjab
- Overall

Note: Family members up to 15 years of age are treated as children
Population Density on Maize Farms

By Region

[Bar chart showing population density per hectare by region: AJK, NWFP, Punjab, Overall.]

By Ecology

[Bar chart showing population density per hectare by ecology: Irrigated Plains, Rainfed Plateaus, Mountain Valleys, Mountain Terraces.]

By Farm Size

[Bar chart showing population density per hectare by farm size: <1 Ha, 1-2 Ha, 2-4 Ha, >4 Ha.]

By Altitude

[Bar chart showing population density per hectare by altitude: <1000 m, 1000-1800 m, >1800 m.]

Persons per Hectare

AJK: 9.9
NWFP: 5.9
Punjab: 2.1
Overall: 4

Irrigated Plains: 2.4
Rainfed Plateaus: 3.7
Mountain Valleys: 6.0
Mountain Terraces: 8.8

<1 Ha: 17.6
1-2 Ha: 7.2
2-4 Ha: 4.2
>4 Ha: 1.5

1-2 Ha, 2-4 Ha, >4 Ha Total Cultivated Area
Frequency Distribution of Educational Level of Maize Farmers, 1989

Percent

Educational Level (Yrs)
Percentage of Maize Farmers with no Formal Education, by Region, 1989

AJK: 33%
NWFP: 65%
Punjab: 34%
Overall: 51%
Percentage of Maize Farmers by Tenure, 1989

- Owners: 75%
- Owners cum Tenants: 9%
- Tenants: 15%
Percentage of Maize Farmers by Tenure, by Ecology

- **Irrigated Plains**:
  - Owners: 61%
  - Tenants: 17%
  - Owner cum Tenants: 23%

- **Rainfed Plateaus**:
  - Owners: 89%
  - Tenants: 9%
  - Owner cum Tenants: 2%

- **Mountain Valleys**:
  - Owners: 82%
  - Tenants: 5%
  - Owner cum Tenants: 13%

- **Mountain Terraces**:
  - Owners: 83%
  - Tenants: 4%
  - Owner cum Tenants: 13%
Irrigated Area to Cultivated Area on Maize Farms, by Region

Percent

AJK  NWFP  Punjab  Overall

7%  48%  88%  68%
Irrigated Area to Cultivated Area on Maize Farms, by Ecology

Percent

<table>
<thead>
<tr>
<th>Ecology</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigated Plains</td>
<td>97%</td>
</tr>
<tr>
<td>Rainfed Plateaus</td>
<td>6%</td>
</tr>
<tr>
<td>Mountain Valleys</td>
<td>27%</td>
</tr>
<tr>
<td>Mountain Terraces</td>
<td>22%</td>
</tr>
</tbody>
</table>
Average Annual Rent of Irrigated Land, by Ecology, 1989

Location of Land
- Near village
- Away from village
Average Annual Rent of Rainfed Land, by Ecology, 1989

Location of Land
- Near village
- Away from village
Average Price of Irrigated Land, by Ecology, 1989

(location of land): Near village | Away from village

(100,000) Rs/ha

- Irrigated Plains
- Rainfed Plateaus
- Mountain Valleys
- Mountain Terraces
Average Price of Rainfed Land, by Ecology, 1989

(100,000) Rs/ha

<table>
<thead>
<tr>
<th>Location of Land</th>
<th>Near village</th>
<th>Away from village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigated Plains</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
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<tr>
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<tr>
<td>Mountain Terraces</td>
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