CHAPTER VII

HIGH YIELDING VARIETY SEEDS: ADOPTION AND PROBLEMS

In this chapter an attempt is made to study the trends in the utilization of high yielding variety seeds and the various problems connected with them in the Agricultural Economy of Karnataka. The chapter has been divided into two sections. Section I presents the trend in the utilization and progress of high yielding variety seeds and their various problems at the macro level i.e., state level. Section II deals with the utilization of high yield variety seeds and their various problems in getting and using them at the micro level i.e., at farm level.

SECTION I

Almost all countries in the world have realised in recent years that quality seed is one of the most effective inputs in farm production. The outstanding achievement of modern agriculture is the innovation of HYV seeds and their use. This has been the kingpin of the new agricultural strategy. The present study has already pointed out that the use of HYV seeds is one of the important factors in increasing farm production. The innovation of HYV seeds, especially exotic variety of wheat and hybrid maize, paddy, jawar and cotton, is the core of the new technique
of farm production. These variety possess some specific characteristics over and above the characteristic of giving maximum yield. Most of them are drought resistant and disease resistant. Further, these can give protection against natural hazards and also give higher yield in a short duration. For example, "A very early rice variety has been evolved... Farmers can cut the crop and carry the grain home just 70 days after they have sown the seeds. Nowhere in the world has anyone evolved any cereal variety - rice, wheat, maize or sorghum - that matures so early. It gives 20 to 25 quintals of rice per hectare - quite a high yield for a variety that matures in just 10 weeks... it does not give much chance to a disease or pest to develop and inflict damage on it". Most of the HYV seeds innovated by the scientists possess these characteristics.

These characteristics of HYV seeds prove their superiority over any seed of local variety. It is, therefore, rightly argued that the new strategy is directly concerned with the application of HYV seeds, for raising the farm output. "The prominent features of the new strategy is the high yielding variety programme in respect of paddy, wheat, bajra, jawar and maize. These variety seeds respond vigorously to heavy doses of fertilizer which have to be supplemented

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by the recommended improved practices". Thus, the main aim of the new technique of production is to increase agricultural production by using HYV seeds.

Therefore one cannot expect a rapid breakthrough in agricultural development without the use of the HYV seeds. Further, the use of these certainly increases yield, income, employment and over all development of the country's economy. Various studies by scholars like Ladejinsky, Sen Sudhir, Centerbery and Bickel, Rao have revealed that the use of these seeds give a number of beneficial effects to the economy, viz., large output, earlier maturity, large employment opportunities, generation of forward and backward linkages, scale neutrality etc.

Thus, the adoption of HYV seeds means an immediate profit for the farm families. It improves the crop in quantity


and quality which finally help the overall development of the country's/State's economy. Therefore, timely distribution of HYV seeds and their proper utilization by the farmers etc., have a direct bearing on the agricultural economy.

The Use of High Yielding Variety in Karnataka:

The year 1965-66 has been generally regarded as the beginning of the adoption of the HYV seeds in India. Since then, a number of HYV seeds of wheat, jawar, cotton, maize and other cereals have been developed and widely distributed in the country. Karnataka did not lag behind in adopting the HYV seeds than the rest of the country. The late sixties gave a rosy picture of agricultural change in the State, particularly because of the use of HYV seeds. Table 7.1 gives the area under various HYV seeds in Karnataka from 1966-67 to 1978-79.

Over a period of 13 years from 1966-67 to 1978-79, the area under major HYV seeds has considerably increased in the State. However, the increase in the area is not uniform in all HYV crops. The highest increase of area is in the case of HYV jawar, whereas the lowest increase is in the case of HYV maize. The index of the area under HYV jawar increased from 100 in 1966-67 to 2,505 in 1978-79, showing an increase in the area by 25 times, whereas during the same period, the index of the area under HYV maize increased from 100 to 860, showing an increase in the area by 8 times.
### Table 7.1

Area Under some of Important RV's in Karnataka

<table>
<thead>
<tr>
<th>Year</th>
<th>JAIW</th>
<th>PADDY</th>
<th>MAIZN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Area</td>
<td>Col.3</td>
<td>% of Index</td>
</tr>
<tr>
<td>Col.2</td>
<td>over 2005</td>
<td>under 2005</td>
<td>Area under paddy</td>
</tr>
<tr>
<td>Col.4</td>
<td>prev. year</td>
<td>prev. year</td>
<td>Area under paddy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>JAIW</th>
<th>PADDY</th>
<th>MAIZN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966-67</td>
<td>2772640</td>
<td>21005</td>
<td>0.75</td>
</tr>
<tr>
<td>1967-68</td>
<td>2519586</td>
<td>44000</td>
<td>1.69</td>
</tr>
<tr>
<td>1968-69</td>
<td>2542223</td>
<td>91460</td>
<td>3.60</td>
</tr>
<tr>
<td>1969-70</td>
<td>2287430</td>
<td>147001</td>
<td>6.43</td>
</tr>
<tr>
<td>1970-71</td>
<td>2244908</td>
<td>182500</td>
<td>8.20</td>
</tr>
<tr>
<td>1971-72</td>
<td>2349767</td>
<td>209289</td>
<td>8.90</td>
</tr>
<tr>
<td>1972-73</td>
<td>2462074</td>
<td>255938</td>
<td>10.39</td>
</tr>
<tr>
<td>1973-74</td>
<td>2315082</td>
<td>380060</td>
<td>16.41</td>
</tr>
<tr>
<td>1974-75</td>
<td>2145673</td>
<td>401850</td>
<td>18.72</td>
</tr>
<tr>
<td>1975-76</td>
<td>1944848</td>
<td>517333</td>
<td>25.60</td>
</tr>
<tr>
<td>1976-77</td>
<td>1806691</td>
<td>331660</td>
<td>18.35</td>
</tr>
<tr>
<td>1977-78</td>
<td>2012939</td>
<td>624698</td>
<td>31.03</td>
</tr>
<tr>
<td>1978-79</td>
<td>1985686</td>
<td>526264</td>
<td>126.49</td>
</tr>
</tbody>
</table>

The indices of the area under both wheat and paddy have also considerably increased (Ref. Col. no. 11 and 16 of Table. 7.1).

Though the area under all the major HYV crops has increased considerably from 1966-67 to 1978-79, more than 80 per cent of this increase had been achieved by the end of 1975-76 itself. The index of the area under HYV jawar increased from 100 in 1966-67 to 2,462 in 1975-76 and thereafter this index remained more or less constant (wheat from 100 to 1,608 and maize from 100 to 768 during the said period). This reveals that the increase in the area under these three HYV seeds has slowed down considerably after 1975-76. Even in the case of HYV paddy the increase has also slowed down considerably after 1975-76 (Ref. Col. no. 16 of Table.7.1).

The changes in area of all four HYV crops over the previous year is also presented in columns 5, 10, 15 and 18 of Table. 7.1. These columns indicate the annual increase in area over the previous year. It can be observed from all these columns that the percentage rise over the previous 9 years was high upto 1975-76 in all the HYV crops and thereafter it was subjected to fluctuations.

It is also found that the growth in the area of all the major HYV crops has been greatly uneven from year to
year instead of being a steady one (ref. Column no. 5, 10, 15 and 18 of Table 7.1). It is argued that for thickly populated countries like India, uneven growth in the areas of crops would adversely affect the food front, leading to a sharp rise in the prices. A steady and continuous increase in the area under all the four HYV seeds of wheat, maize, paddy and jawar would have been more conducive to the growth of output in the farm sector. It is observed that the uneven increase in the area under all these HYV crops is partly responsible for the shortage of some of the essential commodities in the economy.

It can also be observed from the Table 7.1 that the percentage of area under all HYV crops is less as compared to the area under local crops. In spite of the fact that the area under all the major HYV has increased considerably, it forms a rather low percentage of the total area under all these crops. The area under HYV jawar to total area under jawar is 26.49 per cent in 1978-79. The percentage of HYV wheat, however, is slightly higher than that of HYV jawar, but even then it is also low (See Table 7.1). This reveals that even in the year 1978-79 nearly 74 per cent of the total land under jawar and nearly 66 per cent of the total land under wheat continued to be under traditional variety. In other words, high yielding variety of all major seeds are not popular among the farmers of Karnataka.
With a view to understanding the trend in the growth of the area under HYV jawar, wheat, maize and paddy seeds, a straight line was fitted to the data in the Table 7.1. The annual average trend of growth in the area under these four crops are as follows. The annual average trend rate of growth in the area under HYV jawar seeds was found to be 225 per cent per annum. (For wheat 147 per cent per annum, for maize 67 per cent per annum and for paddy 159 per cent per annum).

The above analysis clearly shows that the programme of popularizing HYV among cultivators has not been able to break the barriers of traditional agriculture in Karnataka, at least in the case of HYV jawar and wheat seeds.

Another problem close to this aspect is that there are wide variations in the area coverage under major HYV seeds among the districts in the State. In some districts area coverage of HYV seeds is comparatively higher than in other districts. Of the total area under HYV paddy, 68.08 per cent area is in 7 districts of the State. In case of HYV wheat, 76.91 per cent area is only in three districts of the State. Same is also true in case of HYV jawar, bajra and ragi. However, the area coverage of HYV maize is uniform in all the districts of the State. This uneven coverage of HYV is not confined only to the State but is also a common phenomena in the country. "The area under HYV of rice in Orissa was hardly 13 per cent in 1976-77 while in Punjab it was around
86 per cent, much higher as compared to the all India average of 32 per cent". 7

In the HYV seeds programme, there seems to be a big gap between HYV seeds required for sowing and what was actually distributed for use. Table 7.2 presents the data regarding seeds distributed, seeds required and actual deficits of seeds in the State.

It is found from the data presented in Table 7.2 that in most of the years, the quantity of HYV seeds distributed for general sowing is less than what was actually required. The HYV jawar seeds distributed for sowing was 25,609 quintals in 1976-77 and actual quantity required was 55,990 quintals during the same period. In the case of HYV maize, the quantity of seeds distributed was 23,258 quintals in 1976-77 and actual required quantity was 93,352 quintals. Same is true in the case of HYV wheat and paddy. The same trend is not only continued but also enhanced during the next 5 years. For instance, the HYV jawar seeds distributed for sowing purpose was 39,032 quintals in 1980-81 and the actual quantity of seeds required was 61,538 quintals. Same is true in the case of HYV wheat seeds. However, in case of HYV maize and HYV paddy seeds the quantity distributed

### Table 7.2

<table>
<thead>
<tr>
<th>Crop</th>
<th>1970-71</th>
<th>Actual distributed during the year</th>
<th>1971-72</th>
<th>Actual distributed during the year</th>
<th>1972-73</th>
<th>Actual distributed during the year</th>
<th>1973-74</th>
<th>Actual distributed during the year</th>
<th>1974-75</th>
<th>Actual distributed during the year</th>
<th>1975-76</th>
<th>Actual distributed during the year</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYV Juntai</td>
<td>25609</td>
<td>59990</td>
<td>30381</td>
<td>45015</td>
<td>42238</td>
<td>4208</td>
<td>40480</td>
<td>53846</td>
<td>13366</td>
<td>33620</td>
<td>52299</td>
<td>18666</td>
</tr>
<tr>
<td>HYV Maize</td>
<td>23258</td>
<td>93352</td>
<td>70094</td>
<td>27460</td>
<td>29210</td>
<td>1750</td>
<td>29392</td>
<td>28571</td>
<td>+821</td>
<td>28457</td>
<td>27833</td>
<td>+624</td>
</tr>
<tr>
<td>HYV Paddy</td>
<td>253062</td>
<td>248108</td>
<td>15046</td>
<td>31569</td>
<td>31500</td>
<td>+659</td>
<td>321221</td>
<td>321531</td>
<td>310</td>
<td>375518</td>
<td>395000</td>
<td>19482</td>
</tr>
<tr>
<td>HYV Wheat</td>
<td>11969</td>
<td>14910</td>
<td>2841</td>
<td>133272</td>
<td>150000</td>
<td>16728</td>
<td>132860</td>
<td>130000</td>
<td>+2060</td>
<td>137225</td>
<td>155000</td>
<td>17775</td>
</tr>
</tbody>
</table>

was more than the required quantity in the year 1980-81. It is observed, from the table that in most of the years except 1980-81, the actual quantity distributed was less than the required quantity of HYV maize and HYV paddy seeds. The deficit trend in case of almost all major HYV seeds in the state has been continued even after planned production and distribution of HYV seeds.

The above analysis gives a clear picture regarding the seeds distributed, actual quantity required for sowing and total deficits of major HYV seeds in the State from 1976-77 to 1980-81. Further, it is also observed from the discussion that farmers in the State have all along been facing a scarcity of HYV seeds.

Timely use of HYV seeds largely depends on the efficient distribution system of these seeds. At present HYV seeds in the State are distributed from Agricultural Departments, Co-operative Societies, Private traders and other Government agencies. Unfortunately, distribution of seeds by these agencies is not only inadequate but also untimely. Particularly in the case of Government agencies, including Co-operatives, the HYV seeds distributed are not sufficient to the cultivators and in a majority of cases these agencies distribute seeds only after the sowing operations. This forces the farmers to purchase HYV seeds from private traders by paying higher prices. This also delays sowing
which leads to a decrease in the HYV output. Further, there is favouritism and corruption in the distribution of seeds from the Government agencies, particularly co-operatives.

On the other hand, private traders are mostly distributing seeds timely and to some extent in sufficient quantity. But most of the private traders are dishonest. They are not only charging more prices than the Government agencies but also distributing adulterated, uncertified and low grade seeds to the farmers. The seeds distributed by these agencies are of very poor quality.

A more severe problem in the country is the distribution of adulterated HYV seeds. "Complaints of supply of rotten seeds, and sub-standard and misbranded seeds to the farmers have become common in recent years. Last year (1983-84), the farmers in Orissa were dumped with poor quality paddy seeds... Several farmers in Uttar Pradesh, Haryana and Rajasthan had difficulty in getting quality bajra seeds (1983-84). Today the quality of seeds suffers due to a number of reasons".8 In Karnataka state also the adulteration of HYV seeds is a serious problem.

The fundamental problem of some of HYV seeds is that they are not suitable to all regions. Added to this, they

suffer from various diseases, bad taste and fodder of these crops are also not good in quality.

Maximum yield of farm production not only depends upon the use of new variety but also as how these are used at the farm level. Majority of the farmers after buying new variety of seeds are not using them properly. The major farm level problems are: (i) Improper tillage practices, (ii) wrong sowing, (iii) non-adherence to the recommended doses of seeds, (iv) untimely sowing etc. Apart from these, the other problems are (i) problem of adulterated seeds, (ii) lack of extension, (iii) lack of credit for purchase of seeds, (iv) scarcity of HYV seeds, (v) ignorance of the availability of certified seeds among the farmers, (vi) problem of buying seeds, (vii) crop failure, and (viii) price variation of HYV seeds among the different agencies.

Various studies by scholars like Mukhopadhayay, Vyas and others pointed out some of these farm level problems. But these studies have not discussed such problems in detail. These problems are discussed at length in the following section.

In the Malaprabha Command Area where our study is conducted improved high yielding variety were introduced on a large scale after 1974, when for the first time canal water was made available to the farmers of Saundatti and Waragund talukas. Earlier to this canal, only few farmers with well irrigation were using these seeds in these talukas. Table 7.3 shows the increasing trend and popularity of HYV seeds in the two talukas:

**Table - 7.3**

<table>
<thead>
<tr>
<th>Districts/Talukas</th>
<th>Area under HYV seeds (in acres) 1973-74</th>
<th>1980-81</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dharwad District</td>
<td>2,82,962</td>
<td>4,91,685</td>
</tr>
<tr>
<td>Naragund Taluka</td>
<td>1,725</td>
<td>25,587</td>
</tr>
<tr>
<td>Belgaum District</td>
<td>1,36,495</td>
<td>3,63,514</td>
</tr>
<tr>
<td>Saundatti Taluka</td>
<td>6,935</td>
<td>28,597</td>
</tr>
</tbody>
</table>

With the increasing irrigation facility there is remarkable increase in the area under HYV seeds. The total area covered under HYV seeds in Naragund taluka increased from 1,725 acres in 1973-74 to 25,587 acres in 1980-81, whereas in Saundatti taluka it has increased from 6,939 acres to 28,597 acres during the said period. The area covered under HYV has also considerably increased in both the districts.

The important HYV crops grown by the farmers in these talukas are (i) HYV maize, (ii) HYV cotton, (iii) HYV wheat, and (iv) HYV jawar. However, other HYV crops like sunflower and groundnut are also grown but area under these crops are negligible. Groundnut is grown particularly in Saundatti taluka and sunflower is grown in both the talukas on a small scale. HYV jawar, maize and sunflower are grown during Kharif season, and HYV of wheat is grown during Rabi. Wheat crop is grown after taking Kharif crops like maize and jawar. It is interesting to know the area under HYV of all size groups of farmers in the selected villages. Table 7.4 shows the area under commercial and food HYV of the sample farmers according to farm size.

Area-wise Analysis:

Table 7.4 shows the data regarding the area under commercial HYV and area under food HYV seeds for four major crops viz., Cotton, maize, jawar and wheat. It can be
### Table - 7.4

Use of High Yielding Variety Seeds (area in acres) by Sample Farmers

<table>
<thead>
<tr>
<th>Item</th>
<th>Advanced Villages</th>
<th>Backward Villages</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small farmer</td>
<td>Medium farmer</td>
<td>Big farmer</td>
<td>Total farmer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYV cotton</td>
<td>102.19 (50.50)</td>
<td>234.25 (53.93)</td>
<td>511.19 (52.35)</td>
<td>848.23 (51.80)</td>
</tr>
<tr>
<td>HYV maize</td>
<td>25.36 (12.47)</td>
<td>73.36 (16.89)</td>
<td>168.39 (17.24)</td>
<td>268.21 (16.38)</td>
</tr>
<tr>
<td>HYV jawar</td>
<td>21.32 (10.48)</td>
<td>30.05 (6.96)</td>
<td>51.27 (5.25)</td>
<td>103.24 (6.30)</td>
</tr>
<tr>
<td>HYV wheat</td>
<td>53.32 (26.23)</td>
<td>96.04 (22.14)</td>
<td>244.24 (25.01)</td>
<td>394.20 (24.07)</td>
</tr>
<tr>
<td>Total HYVs</td>
<td>203.29 (100)</td>
<td>434.30 (100)</td>
<td>976.29 (100)</td>
<td>1637.24 (100)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Small farmer</th>
<th>Medium farmer</th>
<th>Big farmer</th>
<th>Total farmer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYV cotton</td>
<td>56.07 (29.66)</td>
<td>117.10 (31.05)</td>
<td>414.12 (33.99)</td>
<td>587.29 (32.91)</td>
</tr>
<tr>
<td>HYV maize</td>
<td>38.24 (20.23)</td>
<td>103.09 (27.33)</td>
<td>327.33 (26.87)</td>
<td>469.26 (26.30)</td>
</tr>
<tr>
<td>HYV jawar</td>
<td>22.35 (11.82)</td>
<td>44.10 (11.71)</td>
<td>142.71 (11.68)</td>
<td>209.36 (11.73)</td>
</tr>
<tr>
<td>HYV wheat</td>
<td>71.16 (37.64)</td>
<td>112.23 (29.75)</td>
<td>333.05 (27.34)</td>
<td>517.04 (27.44)</td>
</tr>
<tr>
<td>Total HYVs</td>
<td>189.02 (100)</td>
<td>377.12 (100)</td>
<td>1218.01 (100)</td>
<td>1784.15 (100)</td>
</tr>
</tbody>
</table>

**Source:** Primary data based on the field work.

**Note:** Figures in the brackets are the percentages of the respective columns.
observed from the table that HYV of cotton, maize, jawar and wheat are sown by the farmers in both the groups of villages. However, the percentage of area under these crops widely varies in between advanced and backward villages.

Of the total area under HYV crops, more area is devoted to cotton in the advanced villages by all categories of farmers. The total area allocated for this crop is 51.80 per cent and remaining three crops accounts for 48.20 per cent of the total area under HYV in these villages. This shows that cotton, which is considered as commercial crop is a widely accepted crop among the HYV crops. As against this, the area allocated for cotton in the backward villages is comparatively very low. The area under this crop is hardly 32.91 per cent of the total HYV area. Remaining 67.09 per cent area is allocated for growing food HYV crops in the backward villages. This reveals that food HYV crops like jawar, wheat and maize are widely accepted crops among the HYV crops.

It can also be observed from Table 7.4 that the area allocated for HYV maize and HYV jawar is comparatively higher in backward villages than in the advanced. The area allocated for maize HYV in the backward villages is 26.30 per cent, whereas it is 16.38 per cent in advanced villages. Same is the position of HYV jawar in both the groups of villages.
It is interesting to note that the area allocated for wheat crop is more or less same in both groups of villages. In the advanced villages, of the total area under HYV, 24.07 per cent area is allocated for wheat and in backward villages, it is 27.44 per cent. The reason is that wheat is the only crop which can be grown during Rabi season and it is an essential food crop for home consumption.

The above analysis clearly shows that farmers in backward villages are raising more of HYV food crops than commercial HYV. This calls for appropriate use of all types of HYV seeds in both the groups of villages.

FARM-WISE ANALYSIS:

Table 7.4 also indicates the data about the area under commercial HYV and food HYV seeds devoted by different size groups of farmers in both the types of villages. It can be observed that both big and medium farmers in both the groups of villages have allocated more area for commercial cotton than small farmers. The area allocated for this crop by big and medium farmers in advanced villages is 52.35 per cent and 53.93 per cent respectively, whereas in backward villages, the area allocated by big and medium farmers for the said crop is 33.99 per cent and 31.05 per cent respectively. For the same crop, area allocated by small farmers in advanced villages is 50.26 per cent and in backward villages it is
29.66 per cent. This shows that the area allocated for cotton by the small farmers in both groups of the villages is lower than medium and big farmers. However, it is interesting to note that the percentage of area allocated for cotton by the small farmers in the advanced villages is considerably higher than that by the small farmers in the backward villages. Further, the area allocated for cotton by the small, medium and big farmers in the advanced villages is more or less same.

It can also be observed from Table 7.4 that small farmers in both the groups of villages have allocated more area for HYV jawar and HYV wheat than medium and big farmers. In the advanced villages, the area allocated by small farmers for HYV jawar is 10.48 per cent of the total HYV whereas it is only 6.91 per cent and 5.25 per cent in the case of medium and big farmers respectively. Same is the position of the small farmers in the backward villages. This also calls for proportionate area under HYV by all size groups of farmers in both the groups of villages.

Changes in Area Under HYV as Compared to Previous Year:

As has been discussed in the earlier paras the area under commercial HYV during the study year was more in the advanced than in the backward villages. This is causing regional imbalances in economic development. This type of
uneven development should be curbed by introducing a balanced cropping pattern in the advanced as well as in the backward villages. If farmers in advanced villages go on bringing more and more area under commercial HYV every year by reducing the area under food HYV, it will have certain repercussions on the economy. On the contrary, if farmers in backward regions continue to grow food HYV crop, it would further widen the gap between the advanced and backward regions. Therefore, there should be proportionate change in the area under all HYV crops depending upon the needs and other requirements of the economy.

In the present work, an attempt has been made to know the changes in the area under various HYV crops of farmers in the selected villages. Table 7.5 presents the data regarding the changes in area under HYV crops as compared to the area in the previous year.

**Area-wise Analysis:**

It can be observed that there is an increase in the area under cotton in advanced villages during the reference year (1983-84) as compared to the previous year (1982-83). Unfortunately, in the backward villages, there is a slight decrease in the area under cotton. In the backward villages, there is a decline of 2.64 per cent of area under cotton as compared to the previous year, whereas in the advanced
**TABLE 7.5**

Change in the Area Under HYV as Compared to Previous Year

<table>
<thead>
<tr>
<th>Crop Year</th>
<th>Small</th>
<th>Medium</th>
<th>Big</th>
<th>Total</th>
<th>Small</th>
<th>Medium</th>
<th>Big</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area (in acres)</td>
<td>% of increase (+)</td>
<td>decrease(-)</td>
<td>Area (in acres)</td>
<td>% of increase (+)</td>
<td>decrease(-)</td>
<td>Area (in acres)</td>
<td>% of increase (+)</td>
</tr>
<tr>
<td>Cotton 1982-83</td>
<td>96.13</td>
<td>-</td>
<td>216.19</td>
<td>-</td>
<td>435.12</td>
<td>-</td>
<td>750.04</td>
<td>-</td>
</tr>
<tr>
<td>Cotton 1983-84</td>
<td>102.19</td>
<td>+4.12</td>
<td>234.25</td>
<td>+8.35</td>
<td>511.19</td>
<td>+17.48</td>
<td>844.23</td>
<td>+11.15</td>
</tr>
<tr>
<td>Wheat 1982-83</td>
<td>55.33</td>
<td>-</td>
<td>101.12</td>
<td>-</td>
<td>305.34</td>
<td>-</td>
<td>462.39</td>
<td>-</td>
</tr>
<tr>
<td>Wheat 1983-84</td>
<td>53.32</td>
<td>-3.63</td>
<td>96.04</td>
<td>-5.01</td>
<td>244.24</td>
<td>-12.00</td>
<td>392.20</td>
<td>-14.74</td>
</tr>
<tr>
<td>Maize 1982-83</td>
<td>29.38</td>
<td>-</td>
<td>76.39</td>
<td>-</td>
<td>201.39</td>
<td>-</td>
<td>308.36</td>
<td>-</td>
</tr>
<tr>
<td>Maize 1983-84</td>
<td>25.36</td>
<td>-13.68</td>
<td>73.36</td>
<td>-3.95</td>
<td>168.39</td>
<td>+16.36</td>
<td>266.21</td>
<td>-13.02</td>
</tr>
<tr>
<td>Jowar 1982-83</td>
<td>20.00</td>
<td>-</td>
<td>40.04</td>
<td>-</td>
<td>76.38</td>
<td>-</td>
<td>137.02</td>
<td>-</td>
</tr>
<tr>
<td>Jowar 1983-84</td>
<td>21.32</td>
<td>+6.66</td>
<td>30.05</td>
<td>-25</td>
<td>51.27</td>
<td>-32.87</td>
<td>103.24</td>
<td>-13.36</td>
</tr>
</tbody>
</table>

*Source: Primary data based on the field work.*
villages there is an increase of 11.15 per cent area under this crop over the previous year.

However, in the case of the remaining three HYV crops there is a decline in the area in the advanced villages. Contrary to this, in the backward villages, the area under other HYV except HYV cotton has increased as compared to the previous year. In advanced villages there is a decline of 14.74 per cent of area under HYV wheat, 13.02 per cent of area under maize and 13.36 per cent of area under jawar as compared to their levels in the previous year, whereas in the backward villages, there is an increase of 5.99 per cent of area under wheat and 14.16 per cent area under maize. But the area under jawar has declined by 6.81 per cent in these villages.

The general observation is that farmers in the advanced villages are reducing the area under food HYV; whereas in the backward villages, there is an increasing trend in the area under food HYV.

Farm-size Analysis:

It is observed from Table.7.5 that in backward villages only medium farmers have brought about a change in case of cotton whereas in advanced villages all size groups of farmers have done so. In advanced villages increase in area under HYV cotton is the largest in case of big as
compared to small and medium farmers. In advanced villages, the big farmers have increased their area under cotton by 17.48 per cent, whereas area under cotton has increased hardly by 4.12 per cent in the case of small farmers. In the backward villages, only medium farmers have increased the area under cotton by 4.37 per cent.

Another striking feature of this aspect is that small farmers in both the groups of villages have increased the area under HYV jawar whereas medium and big farmers have reduced the area under this crop.

In advanced villages, all the size groups of farmers have reduced the area under HYV maize. Contrary to this in the backward villages, except small farmers, the other two categories of farmers have increased the area under this crop.

In case of wheat in advanced villages, the decline in area under HYV has been brought about by all the categories of farmers. But in the backward villages, it is found that all the categories of farmers have increased the area under wheat.

Thus, it can be observed that there is a positive change in area in case of cotton in the advanced villages and negative change for the same crop in the backward villages, while for other HYV crops it is found that area
has decreased in the advanced villages and it has increased in the backward villages. This type of uneven growth of area under various HYV should be reduced for the healthy growth of the economy.

Sources of Supply of HYV seeds:

The outstanding features of the HYV seeds are that they are the product of research and are purchased from the market. In traditional farming where home made seeds are used, cultivators need not depend on others for sowing. In modern farming where HYV seeds are used, farmers will have to depend on the suppliers. Generally sources of HYV seeds can be classified into four categories. Co-operatives, Government Departments, Commission agents and Urban and Local traders. Table 7.6 presents the data regarding the sources of HYV seeds.

It can be observed from table 7.6 that a majority of farmers in both the groups of villages have purchased HYV seeds from all the four sources. However, in advanced villages 41.0 per cent farmers (see col. Jo. 3,4, and 7 of table 7.6) have purchased all the four HYV variety of seeds from Government agencies. Of the 41 per cent, majority of them are from the small and medium farmers. This shows that a majority of the big farmers in advanced villages are purchasing them from other than Government agencies. The
### Table - 7.6

**Purchase of TV sets through different agencies by the poorer**

<table>
<thead>
<tr>
<th>Nature of Village</th>
<th>Government Co-op.</th>
<th>Co-op- eratives</th>
<th>Commission agents</th>
<th>Urban traders</th>
<th>Rural traders</th>
<th>All Others</th>
<th>Total Application</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Village</td>
<td>(1.5)</td>
<td>(2.5)</td>
<td>(7.5)</td>
<td>(12.5)</td>
<td>(14.5)</td>
<td>(15.0)</td>
</tr>
<tr>
<td></td>
<td>Backward Village</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Urban Village</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Backward Village</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Rural Village</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Backward Village</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3</td>
<td>7</td>
<td>12</td>
<td>16</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Backward Village</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Note:** Figures in the brackets are the percentages of the respective rows.

**Source:** Primary data based on the 1970 NSS.
important reasons why large number of big farmers are buying from other agencies than the Government are; (i) their large holdings, (ii) the limited quota supplied by Government, and (iii) normally more area under HYV than the Government notification.

Another noticeable feature of this aspect is that the percentage of farmers buying HYV seeds from purely private agencies like local traders, urban traders and commission agents is less in advanced villages. Only 6.6 per cent farmers in advanced villages have purchased from private agencies. Unfortunately all these families belong to the small and medium categories. These families further belong to tenants, SC, ST etc. These families are not getting HYV seeds either from the Co-operatives or from Government Departments.

The over all performance of the purchase of HYV seeds by the farmers in the advanced villages is far better than that in the backward villages. In the backward villages, only 10.0 per cent farmers have purchased HYV seeds from the Government agencies. This shows the Government's lethargic attitude towards providing HYV seeds to the farmers in the backward villages. As a result a majority farmers in these villages are buying HYV seeds from agencies other than the Government, like, local traders who are predominant in supplying these seeds to the farmers. In all 34.6 per cent
farmers in the backward villages have purchased from private agencies. (See col. no. 5, 6 and 12 of Table 7.6). Of 41 farmers who have purchased seeds from private agencies, 18 farmers belong to small categories. Most of them are small tinny farmers, tenants, SC and STs.

The above analysis gives a clear outline regarding the supply of HYV seeds by various agencies. It can be observed from the discussion that a large number of the farmers in the advanced villages are buying seeds from Government agencies. This clearly reveals that co-operatives to some extent are working efficiently and there is awareness among the people about the availability of seeds. These villages are very near to the urban centres with efficient transportation and availability of extension facilities. In some advanced villages there are sub-centres of agricultural departments, availability of newspapers and agricultural book-lets etc., in the advanced villages. All these are lacking in the backward villages as has been pointed out in the first chapter.

It is also observed from the discussion that a large number of small tenants, SC and ST farmers have not purchased HYV seeds from Government agencies in both the groups of villages. This shows that these farmers are not benefitted by Government agencies.
It can also be observed from the discussion that majority of the farmers in both the groups of villages are buying HYV seeds from private agencies. This indicates the dominance of private traders in supplying HYV seeds. Though there is nothing inherently wrong in this, there is a fear of exploitation of the farmers by these traders in the farm charging high prices, supplying adulterated and uncertified seeds to the farmers.

Price Variation of HYV Cotton Seeds Between the Government and Private Agencies:

Prices of almost all agricultural inputs have considerably increased in recent years. Added to this, agencies involved in distribution of the inputs particularly private traders are exploiting the farmers by charging more than the prescribed prices or the prices charged by the Government agencies. In the present study an attempt is made to understand the extent of price variation between the Government and private agencies.

For this purpose, prices charged by Government agencies and private agencies for cotton HYV seeds are taken into consideration in the present work. During 1983-84 the price fixed by agriculture department for cotton seeds is Rs. 125 per Kg. The reasons for selecting only HYV cotton seeds are (i) almost all farmers are raising cotton, (ii) cotton seeds are very scarce as compared to other HYV
seeds, (iii) there is a great demand for these seeds, (iv) these seeds are distributed by all agencies, (v) these are relatively costly, (vi) large number of farmers have complained only about HYV cotton seed prices, and (vii) cotton crop fetches better prices and thereby gives better income. Table 7.7 shows the price variation of HYV cotton seeds between the Government and private agencies.

Table 7.7 presents the extent of price variation in rupees per kilogram of cotton HYV seeds. It is observed from this data in both the groups of villages that as many as 56.5 per cent farmers have reported the existence of price variation between Government and private agencies. However, the problem is very severe in the backward villages. As many as 68.2 per cent farmers have found the existence of price variation in the backward villages whereas in the advanced villages 44.9 per cent farmers have accepted the existence of this problem.

It is also revealed from this table that the extent of price variation is very high in the backward villages than in the advanced. Further, 54.8 per cent farmers (see Col. 8, 9, 10 and 11 of Table 7.7) in these villages have paid excess of Rs. 10/- per Kg, whereas in the advanced villages only 32.6 per cent farmers have paid this excess amount for one Kg of cotton seeds.
<table>
<thead>
<tr>
<th>Farmer</th>
<th>Nature of Village</th>
<th>Sound Variation</th>
<th>Not found Variation</th>
<th>Total (5 + 4)</th>
<th>Extent of Price Variation in Rs. per Kg of Cotton HYV Seeds</th>
<th>(number)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rs.0.01 to Rs.3.00</td>
<td>Rs.3.01 to Rs.5.00</td>
</tr>
<tr>
<td>Small</td>
<td>Advanced Village</td>
<td>15 (42.9)</td>
<td>20 (57.1)</td>
<td>35 (100)</td>
<td>1 (6.6)</td>
<td>3 (20.0)</td>
</tr>
<tr>
<td></td>
<td>Backward Village</td>
<td>24 (72.7)</td>
<td>9 (27.3)</td>
<td>33 (100)</td>
<td>-</td>
<td>5 (20.8)</td>
</tr>
<tr>
<td>Medium</td>
<td>Advanced Village</td>
<td>14 (37.8)</td>
<td>23 (62.1)</td>
<td>37 (100)</td>
<td>5 (55.7)</td>
<td>3 (21.4)</td>
</tr>
<tr>
<td></td>
<td>Backward Village</td>
<td>22 (62.8)</td>
<td>19 (37.1)</td>
<td>35 (100)</td>
<td>2 (9.0)</td>
<td>4 (18.1)</td>
</tr>
<tr>
<td>High</td>
<td>Advanced Village</td>
<td>20 (54.1)</td>
<td>17 (45.9)</td>
<td>37 (100)</td>
<td>6 (30.0)</td>
<td>8 (40.0)</td>
</tr>
<tr>
<td></td>
<td>Backward Village</td>
<td>27 (69.2)</td>
<td>12 (30.8)</td>
<td>39 (100)</td>
<td>3 (11.1)</td>
<td>6 (22.2)</td>
</tr>
<tr>
<td>Total</td>
<td>Advanced Village</td>
<td>49 (44.9)</td>
<td>60 (55.1)</td>
<td>109 (100)</td>
<td>11 (11.1)</td>
<td>32 (32.2)</td>
</tr>
<tr>
<td></td>
<td>Backward Village</td>
<td>75 (58.2)</td>
<td>54 (41.7)</td>
<td>129 (100)</td>
<td>11 (8.5)</td>
<td>20 (15.6)</td>
</tr>
<tr>
<td>GRAND TOTAL</td>
<td></td>
<td>124 (36.5)</td>
<td>94 (43.5)</td>
<td>218 (100)</td>
<td>16 (7.4)</td>
<td>22 (10.0)</td>
</tr>
</tbody>
</table>

**Source:** Primary data based on the field work.

**Note:** Figures in the brackets are the percentages of the respective rows.
An important point worth noting is that, it is the small farmers in both the groups of villages, who have been more exploited by the private agencies. 39.9 per cent small farmers in advanced villages and 62.4 per cent of the same category in the backward villages have paid an excess of Rs. 15/- per Kg, than the Government price. Added to this some big farmers in both the groups of villages have also been exploited by private agencies. This is mainly because, small farmers purchase seeds on credit from the private agencies. Sufficient attention should be paid in solving these problems.

 adulteration of HYV seed:

Good quality seeds are vital for any agricultural development programmes. Making good quality seeds available to cultivators in time is an urgent necessity from the point of view of service to farmers and also to increase agricultural production. High quality seeds largely determine the success of modern farming as other tillage, cultural and other management practices come into play only after the germination and establishment of the seeds and seedlings. Dhondyal rightly pointed out that "with all the cultural practices and use of needed inputs, if the quality of seeds is poor, the harvest is bound to be poor". 11 Thus for

intensive agriculture, the use of High yielding variety is of great and prime importance, because "unless the farmer has good seeds of suitable variety he cannot get the best out of the other inputs, such as irrigation, fertilizers, insecticides and machinery".12

Therefore, the seed that is supplied to the farmers should conform to certain standards of genetic identity and purity, should be free from seed borne diseases and noxious weeds, should be of good germinating capacity and be able to establish vigorous seedlings.

In India, the modern HYV seed concept had its origin with the Royal Commission on Agriculture in 1928, which proposed the introduction of these seeds. Further, the Commission went into all aspects of agriculture, more so the production of good quality seeds with a high degree of purity. But the real beginning of production and distribution of high quality HYV seeds took place only after the inception of the Five Year Plans in the country. Government has implemented various measures for maintaining the quality of the HYV seeds. For this purpose the Government has passed seeds Act. in 1966. Even then, complaints of supply of rotten seeds and misbranded seeds to farmers have become

common in recent days. For instance, a sample survey conducted by National Seeds Corporation in 1981-82 found that out of the sampled 31,171 cases of seeds distributed that year, 5,612 were below the prescribed standards. In the previous year about 7,300 cases of poor quality seeds were detected in total of 36,095 cases investigated. Many such supplies of poor quality seeds have been debated in Parliament. 13

In the present study an attempt is made to find out the severity of the problem and to identify the supplier of these seeds. Table 7.8 shows the adulterated seeds, received by the farmers and agencies from which adulterated seeds were distributed to the farmers.

It can be observed from table 7.8 that as many as 40.8 per cent farmers in both the groups of villages received the adulterated seeds. However, it is found that the percentage of farmers received adulterated seeds is low in advanced villages than the backward. In the advanced villages 35.0 per cent and in the backward villages 46.6 per cent farmers received adulterated seeds.

Among the different size groups, large number of big farmers in both the groups of villages have received these seeds. For instance, 55.0 per cent big farmers in the

13. Sound legislation but ..., The Hindu, 6 Tuesday, Nov. 1984, p. 17.
Note: Figures in the brackets are the percentages of the respective row.
backward and 42.5 per cent farmers of the same category in the advanced villages have received these seeds. Added to this a considerable percentage of small farmers in both the groups of villages have also received the adulterated seeds. This is mainly because these farmers as has already discussed have purchased HYV seeds from private agencies.

As regards the sources of the supply of HYV adulterated seeds, it is found that a majority of the farmers who have received adulterated seeds owe to the private agencies. Of the 98 farmers who have received adulterated seeds, 51.1 per cent farmers (see Col. no. 6 and 12 of the table, 7, 8) in both the groups of villages have received these seeds from private traders. However the problem is very severe in the backward villages than in the advanced. Of the total 56 farmers those who have received adulterated seeds, 71.4 per cent of these have received worst quality seeds from private traders in the backward villages, whereas in the advanced villages out of 42 farmers who have received adulterated seeds, 49.9 per cent farmers have received from private traders.

Moreover, it is also found that a majority of big and small farmers in both the groups of villages have received adulterated seeds from the private agencies than medium farmers.
An interesting observation can be made from the Appendix table 7.1 regarding the adulterated HYV seeds received by the farmers. It is found from the table that, out of 98 families who have received adulterated seeds, 54 farmers (55.1 per cent) have received adulterated cotton seeds in both the groups of villages. However, the percentage of farmers who have received adulterated cotton seeds is slightly higher in the backward villages. Between the different size groups of farmers, again a large number of big farmers have received these seeds than other categories of farmers in both the groups of villages.

It is also found from the data presented in the Appendix table 7.1 that adulteration problem of other three HYV seeds are not so severe, particularly HYV jawar and HYV maize seeds. This shows that adulteration problem is very severe in the case of HYV cotton seeds. As many as 13 farmers during the present survey work have reported that complete crop failure due to non-germination of these seeds. Another 20 farmers reported 40 to 50 per cent crop failure due to this problem. Further all these families have also reported that these HYV seeds were supplied by Private traders.

Thus it is found from the above discussion that farmers in both the groups of villages received adulterated HYV seeds. However, the problem of adulteration is more
severe in the backward villages. Most of these seeds are distributed by private agencies. In some cases it is also found from the discussion that Government agencies have also distributed such seeds particularly to co-operatives. Further, adulteration problem is more severe in case of HYV cotton rather than other HYV seeds. All this calls for appropriate remedial measures.

*Some General Problems Concerning HYV Seeds:*

Apart from the problems discussed in the above paras farmers in the newly constructed irrigation projects face some other problems like (i) HYV crop failure, (ii) problem of awareness of certified seeds, (iii) transportation problem etc. Table 7.9 shows various problems faced by the farmers in the selected villages.

(i) HYV Crop Failure Problem Faced by the Farmers:

It has been observed by an eminent research scholar that the HYV seeds are more susceptible to pests and diseases. It is stated that "the new plant varieties form a dense of crop canopy. This kind of canopy also promotes the greater evidence of some pests which were not important before." 14

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Table - 7.9

Some General Problems Concerning HYV seeds
(Number of farmers)

<table>
<thead>
<tr>
<th>Farmer Nature of Villages</th>
<th>HYV Crop failure of the farmers</th>
<th>Awareness of certified seeds among the farmers</th>
<th>Opinion regarding taste and quality of HYV products</th>
<th>Transportation problem for bring HYV seeds by the farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crops failed</td>
<td>Crops not failed</td>
<td>Aware</td>
<td>not aware</td>
</tr>
<tr>
<td>Small Advanced Village</td>
<td>35</td>
<td>25</td>
<td>29</td>
<td>11</td>
</tr>
<tr>
<td>Backward Village</td>
<td>27</td>
<td>13</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Median Advanced Village</td>
<td>14</td>
<td>26</td>
<td>31</td>
<td>9</td>
</tr>
<tr>
<td>Backward Village</td>
<td>23</td>
<td>17</td>
<td>25</td>
<td>17</td>
</tr>
<tr>
<td>Big Advanced Village</td>
<td>21</td>
<td>19</td>
<td>32</td>
<td>8</td>
</tr>
<tr>
<td>Backward Village</td>
<td>29</td>
<td>11</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td>Total Advanced Village</td>
<td>50</td>
<td>70</td>
<td>92</td>
<td>28</td>
</tr>
<tr>
<td>Backward Village</td>
<td>79</td>
<td>41</td>
<td>66</td>
<td>54</td>
</tr>
<tr>
<td>Village</td>
<td>129</td>
<td>111</td>
<td>158</td>
<td>82</td>
</tr>
<tr>
<td>Grand Total</td>
<td>129</td>
<td>111</td>
<td>158</td>
<td>82</td>
</tr>
</tbody>
</table>

Source: Primary data based on the field work.

Notes: Figures in brackets indicate percentages.
To be more specific, as pointed out by Oivaraman15 that when we come onto cotton, we are finding various other problems... like boll dropping... many plants dropped as much as 80 per cent of the bolls that were formed... much of the boll dropping is really due to insect attack of various kinds of different seasons. Apart from pest and disease problems of HYV crops they need timely water, proper management, timely weeding, timely use of pesticides etc.

In the present study an attempt is made to investigate the number of families facing crop failure problem and reasons for crop failure. It is found from the data presented in Table 7.9 that as many as 41.6 per cent of farmers in the advanced villages and 65.6 per cent in the backward villages have faced the crop failure problem. Among the different size groups it is again found that large number of big farmers have faced this problem than small and medium farmers in both the groups of villages. However, in the backward villages, large number of farmers in all size groups are facing this problem than the farmers of all size groups in the advanced villages.

During the field work, an attempt was made by the researcher to understand the reasons responsible for the crop failure of the farmers in the advanced and backward villages. Broadly, ten reasons were found to be responsible for the crop failure. They were (1) diseases, (2) scarcity

of water, (iii) wrong use of fertilisers and pesticides, (iv) ignorance and illiteracy, (v) non-availability of pesticides, (vi) lack of extension facilities, (vii) non-use of pesticides, (viii) adulterated pesticides, (ix) costly pesticides, and (x) lack of weeding. Among these reasons, as pointed out by the majority of farmers, diseases and insects are the main factors for crop failure.

Following are some major diseases and insects for affecting HYV crops -

1) **Cotton:**

Leaf curl, leafminers and wilt are the common diseases found in cotton crop. Apart from these diseases, many insects and pests destroy the standing crop. They mainly include, mely bug, red cotton bug, dusky cotton bug, leaf roller, pink bollworm, spotted bollworm, mites, thrips and helothis.

2) **Wheat:**

Rust in wheat is the very common disease found by majority of farmers in both the groups of villages. However, the problem is more severe in the backward villages. The other diseases which are commonly found for wheat are, leaf blight and loose smut. Apart from these diseases many insects destroy the crop. They include stem borer, stink bug, plant hopper, root gurb and aphid.
3) Hybrid maize: Hybrid maize is grown in both the groups of villages in which rust, leaf blight and downy mildew are common diseases found to this crop. The problem is more severe in the backward villages. In addition to these diseases, many insects destroy the standing crop. They mainly include cob-worm, stem borer and root grub.

4) Hybrid Jawar: Dust, leaf sport, downy and grain spot are the common diseases found for jawar crop. The major insects which are common to this crop are, surface grass, hopper, shootfly, shoot bug and earhead bug.

It is observed that crop failure due to diseases and insects are more common in the backward villages than in advanced villages. Farmers in the backward villages are not spending more on chemical pesticides. The average per acre expenditure on pesticides in advanced villages is Rs. 189.39 and in the backward villages, it is Rs. 118.85.

(ii) Awareness of Certified Seeds among the Farmers: All the HYV seeds are certified by the Government agencies in the country. Certified seeds are considered as the best seeds for raising maximum output. These certified seeds are generally tested scientifically.
will reveal the content of the pure seed true to the variety mentioned, inert matter, weed seeds and seeds of other variety. Germination percentage and the expected longevity, which partly depends on the moisture content of seed at the time of packing and the type of packing used. "Certification means that some formal statement is to be made either about the seed crop or about the harvested seed itself. This statement will indicate that certain checks have been made to ensure that the seed is being produced in a way which will preserve the characteristics of the cultivator." 16

The seed certification system maintains the pre-degree records of crop variety and makes available the source of genetically pure seeds for general distribution. A certified seed guarantees high yield, good quality, high germination, genetic purity, disease resistant, physical purity, good harvest. The knowledge with regard to all these aspects of the certified seeds on the part of the farmer is a pre-condition for a good harvest. But large numbers of farmers are not aware of these aspects, and many of them have not even heard of the 'Certified Seed'. Such farmers may use sub-standard and adulterated seeds. Table 7.9 shows the knowledge of the farmers with regard to certified seed.

It is observed from the data presented in Table 7.9 that as many as 25.5 per cent of farmers in advanced villages and 45.0 per cent in the backward villages are unaware of certified seeds. And these families have not even heard of 'Certified Seeds'. Naturally, these families may buy uncertified seeds. Most of these families, while survey work was in progress reported to have received adulterated seeds and it was these farmers who faced the crop failure problem also.

(iii) Problem regarding the Taste and Quality of HYV Products:

Acceptance of HYV seeds largely depends on the taste and quality of the output. If quality and taste is good, farmers easily accept and continue to use these seeds. However, acceptibility also largely depends on yield, availability, prices of the HYV seeds and price of the output. Taste and quality of some of the HYV products have become a problem to both farmers and consumers. Divaraman strongly criticised the quality and taste of HYV products. Further he pointed out that quality and taste of some of HYV products like Jawar, wheat etc., are not upto the mark. As a result, there is less demand for these products. This may adversely affect the area under such crops. In many cases

area under such crops may decrease and in certain cases farmers may stop using such seeds. A study by Savale reveals that about 6 per cent farmers in Pune district of Maharashtra State have not adopted food HYV crops mainly because of bad quality, and bad taste. In the present study an attempt is made to investigate the farmer's reactions about the taste and quality of the HYV products and the number of farmers who have discontinued the use of such seeds after adopting once.

Two separate questions were asked to investigate the above problem. One question relating to the taste and quality of food HYV products to the farmers as a consumer reveals the following:

It can be observed from the data given in Table 7.9 that as many as 86.7 per cent of farmers in advanced villages and 74.2 per cent in the backward villages indicated that the quality and taste of HYV crops particularly HYV jawar are very bad.

Further, another question was asked specifically to the growers of HYV jawar crops regarding the reduction of area and discontinuation of growing due to bad taste and quality of HYV jawar as compared to the previous year.

It is interesting to note that medium and big farmers have reduced the area under jawar in both the groups of villages as compared to previous year. (Ref. Col. 3, 5, 11 and 13 of Table. 7.5 * of this chapter, first row from the bottom). The area under this crop of these farmers decreases from 324.12 acres in 1982-83 to 268.33 acres in 1983-84, showing 17.1 per cent decrease in the area within a period of only one year. Further, it is interesting to note that 14 farmers have completely stopped raising jawar in both the groups of villages (who were the adopters of HYV jawar during 1982-83). However, the farmers who have reduced the area or stopped raising of jawar crop, have given some other reasons apart from bad taste and quality. The important one is the low prices of the jawar output. Therefore, if this trend is continued in future years, it would adversely affect the economy and lead to scarcity of food grains. For solving this problem scientists should innovate better quality seeds, which would aim not only at better output but also better quality and taste. Further, the Government should give better prices to the growers of HYV food crops.

(iv) **Transportation Problem and HYV Cultivation:**

Efficient transportation is a prerequisite for timely availability of seeds, timely sowing, timely consulation, timely use of other inputs and timely disposal of their products. Thus efficient transportation certainly increases the yield and income of the farmers. On the other hand,
inefficient transportation will certainly hamper the output of the farmers in a particular region. Jhawa and Singh have found that the most important factor responsible for inter-district variations in agricultural productivity is infrastructure. According to them, the inter-district variation in Punjab can be narrowed down to the extent of 60 per cent by providing a uniform infrastructure including transportation. In the present work an attempt is made to understand the transportation problem faced by the farmers in using HYV seeds.

It will be observed from Table 7.9 that all the farmers in backward villages have faced the transportation problem. As has been already discussed in the first chapter all the backward villages are lacking efficient transportation system. This is causing delay in the spread of new knowledge to these villages. This is due to lack of transportation system. Out of 120 farmers in the backward villages, 61 farmers reported that timely sowing was not possible, 23 farmers indicated that they could not meet extension officers timely, 71 farmers reported that timely use of other inputs was not possible, 21 farmers reported wastage of HYV seeds, 29 farmers reported that they could not fetch higher price for the output, 9 farmers have reported wastage of

output, no such complaints were made by farmers in the advanced villages. This is causing to some extent regional disparity in agricultural development between these two groups of villages. This calls for efficient transportation system to the backward villages.

Adoption of Recommended Practices for Cotton and Maize:

As has been already pointed, the farmers in the Jalaprabha Command Area started growing HYV crops only after 1974. Before this, farmers were concentrating only on cultivation of non-irrigated food crops. The tillage and sowing practices of the farmers were simple and traditional in nature. Due to the advent of irrigation in 1974 in this region, the cultivators for the first time in their life span were exposed to sophisticated technology. HYV cotton, maize and wheat were best suited to this area according to agricultural scientists. Thus farmers have been asked to grow these crops on scientific basis on a large scale. All this requires different techniques and methods of cultivation which need the accurate understanding of such complex technologies by the farmers to the fullest exploitation of yield potential. The present work is designed to investigate how many farmers have followed the recommended practices for cotton and maize crops.
In this study the number of farmers who have adopted recommended practices for cotton and maize crops are considered. This is mainly because of the following reasons: (i) these two crops are grown during Kharif season (ii) tillage and sowing practices are more or less same for both crops than Rabi wheat and jawar, (iii) majority farmers are growing these two crops, and (iv) cotton being superior and maize being inferior crop, comparison of the practices in between two become meaningful. The objectives of this section are as follows:

i) to know how many farmers have adopted recommended practices;

ii) to which crops farmers are following recommended practices;

iii) in which regions farmers are following recommended practices;

iv) who are the followers of the recommended practices;

v) to find out the reasons for non-adoption of recommended practices.

For assessing all these objectives, the officials in the various Government departments and sample farmers in the selected villages were approached. At the first phase, the officials of the Department of Agriculture and Extension Units of Saundatti and Nargund Talukas were consulted. These agencies have been popularising and demonstrating the
package of practices for all HYV crops including maize and cotton in the Balapobha Command Area since 1972-73. These practices were recommended jointly by the Department of Agriculture and University of Agricultural Sciences, Bangalore, which are published in the form of booklet called "Package of Practices for High Yields" in July 1975. A number of practices were recommended by these agencies, but in the present study the following six practices were included. They are:

I. tillage practices for cotton and maize;
II. application of farm yard manure;
III. recommended spacing between rows and plants for both the crops.
IV. recommended quantity of seeds for cotton and maize;
V. number of plant protection sprays; and
VI. sowing season for both crops.

The selected farmers were asked about the adoption of these six selected farm practices. As shown in Table 7.10 these practices were selected as (i) these are relevant to the present chapter, (ii) generally applicable to all farmers in the locality, and (iii) practices whose adoption could be rather easily determined in response to one or two questions. Other practices like recommended irrigational practices to the above crops have been already discussed in the irrigation
Further the practices like frequency of fertilizer use, method of fertilizer application etc., will be discussed in the next chapter. However, some other recommended practices are left out from the present study due to constraints like resources, space, time etc. In the second phase, 240 sample farmers in 8 villages were interviewed with the intention of assessing the popularity of recommended practices, which were spread by the Department of Agriculture in both the talukas. The following paras deal with the recommended practices for cotton and maize crops and the followers of such recommended practices: Table 7.10 shows the selected recommended practices for cotton and maize.

A study of this would be of great importance to focus on the future extension educational programmes on these aspects. Further, it will be useful to the researchers, policy makers and local extension agencies.

It has been observed by an eminent research scholar of our state that the recommended practices will help farmers in raising maximum output. According to his study, output of ragi in the Karnataka State has increased by 38 per cent by adopting improved tillage practice alone. Various studies by agricultural scientists of Agricultural University, Dharwad...

### Table - 7.10
**Selected recommended Practices**

<table>
<thead>
<tr>
<th>Item</th>
<th>Recommended Practices for Cotton Crop</th>
<th>Recommended Practices for Maize Crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.  Tillage</td>
<td>Deep tillage. Land must be ploughed once by Iron plough or <em>disk</em> in place of wooden plough before sowing</td>
<td>Deep tillage. Land must be ploughed once by Iron plough or <em>disk</em> in place of wooden plough before sowing</td>
</tr>
<tr>
<td>II. Sowing season</td>
<td>July 15 to August 15</td>
<td>June 1 to July 15</td>
</tr>
<tr>
<td>III. Quantity of seeds</td>
<td>1 Kg per acre</td>
<td>6 Kg per acre</td>
</tr>
<tr>
<td>IV. Spacing between rows and plants</td>
<td>a spacing of 4 feet between rows and 2 ft. between plants.</td>
<td>a spacing of 24 inch between rows and 12 inch between plants</td>
</tr>
<tr>
<td>V. Farm yard manure</td>
<td>4,500 Kg to 5,000 Kg per acre</td>
<td>4,000 Kg per acre</td>
</tr>
<tr>
<td>VI. Number of plant protection sprays</td>
<td>Total 8 spray</td>
<td>Total 4 to 5 spray</td>
</tr>
</tbody>
</table>

**Source:** Package of practices for High Yields (University of Agricultural Sciences and Dept. of Agriculture). 1982.

Campus, revealed that recommended practices in this region have helped in raising maximum output. A study by Gowda\(^\text{21}\) of the Agricultural University indicated that adoption of...
major recommended practices helps in raising output of cotton from 6 quintals (without following any practice) to anywhere between 12 to 14 quintals (by adopting major recommended practices including water, fertilizers, tillage, row spacing, time of sowing etc.).

I. Tillage Practices:

Tillage practices particularly for HYV crops, are key elements for successful crop production. The main purposes of these practices prior to sowing and planting is to create a soil condition suitable for maximum performance of the plant growth. Tillage practices generally meet the following requirements for crop production:

i) weed control and reduction of the number of weed seeds in the soil;

ii) creation of improved soil physical conditions resulting in water, air, water-root, air-root and temperature-root relationships;

iii) better fertilizer-seed relationships;

iv) soil cover with plant residues resulting in more absorption of rain water which helps in reducing soil erosion; and

v) reduced root impedance.

Therefore, each farmer must know what type of tillage equipments should be used and how many times land should be tilled.
Recommended Tillage Practice for Maize and Cotton:

Deep tillage is a must for successful growth of both cotton and maize. The recommended practice is that land must be ploughed once by Iron Plough/Disk in place of wooden plough before sowing. The user of Iron Plough/Disk is considered as adopter of the tillage practices, while the user of wooden plough is considered as non-adopter of the tillage practices. Further it is assumed that a farmer who ploughed his land with iron plough/disk even for a small portion of his land is considered as adopter.

II. Sowing season:

Maximum yield per acre of HYV crops not only depends on tillage practices, quality seeds etc., but also on timely sowing. Timely sowing is important from the yield and field occupation period points of view. Delay in sowing invariably causes reduction in yield. A study by Halappa and others reveals that delay in the sowing of HYV crops will certainly cause reduction in yield. On the other hand, early sowing also causes reduction in the yield. Therefore timely sowing is a pre-condition for better output.

Recommended Sowing Period for Maize and Cotton seeds:
The best season for cotton sowing is from the middle of July to the middle of August and for maize, June 1st to

July 15th. For assessing this the farmers were asked to indicate the sowing month/week/day for cotton and maize crops. A farmer who reveals correct recommended dates is considered as adopter of this practice.

III. Use of Recommended Quantity of HYV seeds:

In this connection it may be pointed out that the quantity of seeds used per acre is equally important for higher output. Both excess or less use of seeds adversely affect the crop output. Excess use, particularly, causes unhealthy plant growth leading to reduction in the output. Therefore, it is argued that the use of appropriate quantity of seeds will certainly help healthy plant growth and increase output.

Recommended quantity of seeds:

The recommended seed rate for cotton is 1 kg per acre and 6 kg per acre in case of maize. A farmer who uses recommended quantity of HYV cotton and maize seeds is considered as an adopter.

IV. Spacing Between the Rows and Plants:

Spacing between the rows and plants is considered as one of the very important methods for increasing farm output. It helps healthy plant growth. Further in the case of crops which are sown with appropriate spacing the incidence of disease is less. It reduces the chances of the
spreading of the pathogen from the diseased root to the healthy one.

**Recommended Spacing Between Rows and Plants:**

In the Jalaprabha Command area, for cotton crop the recommended spacing between two rows is 4 feet and from plant to plant it is 2 feet and for maize crop spacing between two rows is 2 feet and from plant to plant it is 1 foot. A farmer who followed correct spacing practices is considered as adopter of this practice.

V. **Farm Yard Manure:**

Farm yard manure is a very important input for higher yield. It is argued that best results are secured when both organic and inorganic manures are used in combination.

The use of organic manure including compost and green manure increases the water holding capacity of the soil, improves the tilth of clay soil by opening it, increases the accretion, facilitates drainage and requires less water for crops. It reduces the loss of mineral nitrogen leaching and decreases the alkalinity of the alkaline soil. It creates crumb structure in soil which is important from agricultural point of view. It also increases the organic matter content of the available *nitrogen* in the soil.
Recommended Practice:

The recommended farm yard manure rate is 4,500 Kg to 5,000 Kg per acre for cotton and 400 Kg per acre for maize crop. The user of this quantity is considered as adopter of this practice.

VI. Use of Pesticides:

With the introduction of high yielding variety seeds, there has been a considerable increase in farm production, but it has simultaneously produced new pests and diseases. The pests and diseases which were hitherto known as minor, have assumed the status of major ones due to the change in the micro-climatic conditions in the crop field. Therefore, more efforts will have to be made for protection of the crops from various diseases by timely use of pesticides. It is argued that the attempts for higher yields become futile without timely application of chemical pesticides.

Recommended Plant Protection Sprays:

The recommended practice is as follows: In order to prevent and destroy various diseases insects, Anadin (20% EC) Carbaryl (50% WP), Phosphomedon (100% EC), Limethoate (30% EC), Wettable sulphur etc., mixed with water is to be sprayed 8 times to cotton. For maize crop, the important pesticides which are to be used are: Amosulfan (35% EC), Carbaryl (50% WP), Malathion 5%, Zineb etc. These are to be
applied along with appropriate quantity of water for about
4 to 5 times/sprays. A farmer who follows the recommended
sprays is considered as adopter of this practice.

The above analysis makes clear the important
functions of selected recommended practices for improving
the efficiency of agriculture. Table 7.11 indicates the
extent of adoption of the selected practices.

Area-wise analysis:

It is observed from the table that the percentage
of farmers adopting all the recommended practices for both
cotton and maize is the higher in the advanced villages
than in the backward.

(i) Tillage Practices:

In the advanced villages, the percentage of farmers
adopting the tillage practices for cotton and maize is
found to be 60.5 and 45.2 per cent respectively. As against
this, in the backward villages, 34.5 per cent farmers for
cotton and 31.3 per cent farmers for maize have adopted
this practice. Of the total adopters of this practice in
the advanced villages, 36 farmers had used Disk and 30 had
used Iron Plough for this purpose. Whereas in the backward
villages, 11 farmers had used Disk and 26 had used Iron
plough for the said purpose. This reveals that farmers in
the backward villages are lagging far behind in adopting
this practice.
### Table 7.11

**Farmers Adopting Different Recommended Practices for Cotton and Maize**

<table>
<thead>
<tr>
<th>Village</th>
<th>Farmer</th>
<th>Total No. of Farmers raising Cotton</th>
<th>Percentage of Farmers Adopting Recommended Practices for Cotton</th>
<th>Percentage of Farmers Adopting Different Recommended Practices for Maize Crop</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Iron Plough Yard Manure</td>
<td>Quantity of MV Seeds</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Iron Plough Yard Manure</td>
<td>Quantity of MV Seeds</td>
</tr>
<tr>
<td>ADVANCED</td>
<td>Small</td>
<td>35</td>
<td>62.8</td>
<td>45.7</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>37</td>
<td>62.1</td>
<td>40.0</td>
</tr>
<tr>
<td></td>
<td>Big</td>
<td>37</td>
<td>57.0</td>
<td>35.1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>109</td>
<td>60.5</td>
<td>40.0</td>
</tr>
<tr>
<td>BACKWARD</td>
<td>Small</td>
<td>33</td>
<td>42.4</td>
<td>39.3</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>35</td>
<td>34.3</td>
<td>37.7</td>
</tr>
<tr>
<td></td>
<td>Big</td>
<td>39</td>
<td>29.2</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>107</td>
<td>34.5</td>
<td>35.5</td>
</tr>
<tr>
<td>GRAND TOTAL</td>
<td></td>
<td>216</td>
<td>47.6</td>
<td>38.4</td>
</tr>
</tbody>
</table>

**Source.** Primary data based on the field work.
Another noticeable feature of this aspect is that a large percentage of farmers have adopted tillage practices for cotton crop rather than for maize in both the groups of villages.

(ii) Sowing Season:

The percentage of followers of this practice for both crops is higher in the advanced villages than in the backward. In the advanced villages, 84.5 per cent farmers for cotton and 78.5 per cent for maize have followed the recommended sowing season. Contrary to this, in the backward villages, 73.8 per cent farmers for cotton and 65.1 per cent for maize have followed this practice.

It is also found that a large percentage of farmers have followed this practice for cotton rather than for maize crop in both the groups of villages.

(iii) Quantity of seeds Used:

It is observed from table 7.11 that wide differences exist in adopting of recommended quantity of seeds in the advanced and backward villages. In the advanced villages 72.4 per cent farmers have used recommended quantity of seeds for cotton crop whereas in the backward villages, it is only 45.8 per cent for the said crop. The adoption trend in the use of recommended quantity of maize seeds is also very low in the backward villages. It is found that
69.0 per cent farmers in the advanced villages 43.1 per cent farmers in the backward villages have used recommended quantity of seeds for maize crop.

Of the 30 non-adopters of recommended quantity of seeds for cotton in the advanced villages, 21 farmers had applied less than the recommended rate while 9 had applied more than the recommended rate. For maize, out of the 26 non-adopters, 20 farmers had applied less than the recommended rate while 6 had applied more than the recommended rate. Contrary to this, in the backward villages, of the 58 non-adopter of recommended quantity of seeds for cotton 44 farmers had applied more than the recommended rate while 14 had applied less than the recommended rate. For maize crop, out of the 49 non-adopters, 39 farmers had used more than recommended rate while 14 had used less than the required rate. This clearly shows misutilization of costly inputs in the backward villages.

(iv) Spacing Between Rows and Plants:

It may be observed from the data given in table 7.11 that larger number of farmers in the advanced villages have followed this practice than the farmers in the backward villages. In the advanced villages, 71.4 per cent farmers for cotton, 69.0 per cent farmers for maize crop have adopted recommended spacing between the rows and plants. As against this in the backward villages, 45.2 per cent farmers for cotton and 43.1 per cent for maize have adopted
this practice. This indicates that a large number of farmers in the backward villages have not followed recommended spacing for both maize and cotton.

Of the 30 non-adopters of this practice for cotton in the advanced villages, 12 farmers had maintained a distance of 5 feet and 9 more a distance of 6 feet between two rows. As regards the recommended distance between two plants none of these have (21 farmers) followed the recommended distance of 2 feet. The remaining 9 farmers had maintained a distance of 3 feet between two rows. These farmers (9) also have not followed the recommended distance between two plants.

Of the 58 non-adopters of recommended spacing between rows and plants for cotton in the backward villages, 27 farmers had maintained a distance of 3 feet and 17 a distance of 3 feet 6 inches between two rows. These farmers (44) have also not followed the recommended distance between the two plants. Remaining 14 farmers had maintained a distance of 5 feet between two rows and they have also not followed the recommended distance between two plants.

Moreover, it is also found that a large number of farmers in both the groups of villages have followed recommended spacing between rows and plants for cotton than maize crop.
(v) Farm Yard Manure:

Table 7.11 also provides an overview of the trend with regard to adoption of recommended quantity of farm yard manure in the advanced and backward villages. In the advanced villages, 40 per cent farmers for cotton and 16.6 per cent for maize crop have used the recommended quantity of farm yard manure, whereas in the backward villages, 36.5 per cent farmers for cotton and 15.1 per cent for maize crop have applied the recommended quantity.

Of the 60 per cent non-adopters (i.e., 65 farmers) of recommended quantity of farm yard manure for cotton in the advanced villages, 9 farmers have used more than the recommended quantity, 46 have used less than the recommended quantity and 10 have not at all used farm yard manure. The position in the case of maize in these villages is as follows: Of the 83.3 per cent non-adopters (70 farmers) of recommended quantity of farm yard manure for maize, none of them have used more than recommended quantity, 31 have applied less than the recommended quantity and 39 have not at all applied farm yard manure.

The position of the non-adopters in the backward villages is as follows: Of the 63.3 per cent non-adopters (i.e., 68 farmers) of recommended quantity of farm yard manure for cotton in the backward villages, 14 have applied
more than the recommended quantity, 38 have applied less than the recommended quantity and 16 have not applied. The total non-adopters for maize crop in the backward villages is 84.8 per cent. (i.e., 73 farmers). Of this 3 have used more than recommended quantity, 27 have used less than the recommended quantity and 43 have not applied farm yard manure for maize.

(vi) Number of Application of Plant Protection Sprays:

In the advanced villages 48.6 per cent farmers for cotton have applied recommended doses of 8 plant protection sprays, whereas in the backward villages for the same crop 29.9 per cent farmers have done so. For maize crop the adoption position is as follows: 35.7 per cent farmers in the advanced and 26.7 per cent farmers in the backward villages have applied the recommended doses of 4 to 5 plant protection sprays. This shows that large number of farmers in the backward villages have not followed this practice. However, in the advanced villages the percentage of adopters of this practice is low as compared to other selected practices except in the case of farm yard manure.

The overall position of the non-adopters of recommended practice of plant protection sprays is as follows:

Of the 48.6 per cent non-adopters (53 farmers) of recommended practice for cotton, 4 have applied more than
the recommended sprays, 43 have applied less than the recommended and 6 have not applied any plant protection sprays in the advanced villages. In the case of maize crop, in all 64.3 per cent farmers (i.e., 54 farmers) have not followed this practice. Of this, 1 has applied more than the recommended sprays, 28 have applied less than the recommended sprays and 25 have not applied any plant protection sprays in the advanced villages.

In the backward villages, 70.0 per cent (i.e. 75 farmers) have not followed the recommended practice sprays for cotton. Of the total non-adopters, 15 have applied more than the recommended sprays, 46 have applied less than the recommended and 14 have not applied any sprays. For maize crop, 73.2 per cent (i.e., 63 farmers) have not followed recommended practices of sprays. Of this, 5 have applied more than the recommended number of sprays, 30 have applied less than the recommended number and 28 have not at all applied any plant protection sprays.

**Farm-wise Analysis:**

Table 7.11 also provides an idea with regard to adoption of recommended practices by different size groups of farmers in the selected villages. The following paras throw light on this aspect.
(i) **Tillage Practices:**

It is observed that larger number of small farmers have adopted tillage practices than medium and big farmers in both the groups of villages. In the advanced villages, 62.8 per cent small and 57.0 per cent big farmers have adopted recommended tillage practices for cotton crop. In the backward villages, 42.4 per cent small and 28.2 per cent big farmers have adopted this practice for cotton.

For maize crop the adoption position of different size groups of farmers is as follows: In the advanced villages, 47.3 per cent small and 44.0 per cent big farmers have adopted recommended tillage practices. As against this, in the backward villages, 37.3 per cent small and 28.9 per cent big farmers have adopted the said practice.

It is interesting to note that the percentage of farmers adopting tillage practices for both cotton and maize crops in the advanced villages by different size groups varies within a narrow margin. Contrary to this, in the backward villages, the percentage of farmers adopting tillage practices is not only low but the adoption ranges between different size groups is also wide.

It is also found that in general, the adoption rates decrease as the size of holdings increases. This indicates that both small and medium farmers are cultivating their lands more efficiently than the big farmers.
(11) **Sowing season:**

It is found that a larger number of small and medium farmers have adopted recommended sowing season practice for cotton and maize crop than big farmers in both the groups of villages.

In the advanced villages, 85.7 per cent small and 89.1 per cent medium farmers have adopted this practice for cotton whereas 78.3 per cent big farmers have adopted the said practice. Same is the pattern of adoption practice for maize crop by these categories of farmers in the advanced villages.

It is also found that in the backward villages also both small and medium farmers are ahead than the big farmers in adopting this practice for both crops. 84.8 per cent small and 82.8 per cent medium farmers have adopted this practice as against 69.2 per cent big farmers of these villages. Even in the case of maize crop also larger number of small and medium farmers have adopted this practice than big farmers. This analysis reveals that small and medium farmers are ahead in following recommended sowing season than the big farmers in both the groups of villages. The reason for the big farmers lagging behind is their large size holdings.
(iii) Use of Recommended Quantity of Seeds:

It is interesting to note that the percentage of farmers using recommended quantity of seeds for both the crops in the advanced villages by all size groups of farmers varies within a very narrow range, 71.4 per cent small, 75.6 per cent medium and 70.2 per cent big farmers have used recommended quantity of 1 kg. seed for cotton crop. Whereas for maize crop, 68.4 per cent small, 70.9 per cent medium and 67.8 per cent big farmers have used recommended quantity of 6 kg. seeds.

In the backward villages, the adoption trend is as follows: 48.5 per cent small, 42.8 per cent medium and 46.1 per cent big farmers have used the recommended quantity of 1 kg cotton seeds. For maize crop, it is found that 37.5 per cent small, 43.7 per cent medium and 44.7 per cent big farmers have used the recommended quantity of 6 kg seeds.

The above analysis indicates that size of the farm is not coming in the way of adopting the recommended quantity of seeds in both the groups of villages. It is also found that while adopting this practice, the farmers, in both the groups of villages are not making any distinction between cotton and maize crop etc.
(iv) Spacing between rows and plants:

It is interesting to note that the farmers who have adopted recommended quantity of seeds have also followed this practice in both the groups of villages. This is because both are related and go hand in hand. Hence the same percentage of farmers have adopted this practice. Therefore, it can be concluded that size of the farm is also not hindering the adoption of recommended spacing between the rows and plants.

(v) Farm yard manure:

In the case of recommended organic manures, small farmers are ahead of the medium and big farmers in adopting this practice in both the groups of villages.

In the advanced villages, 45.7 per cent small, 40.0 per cent medium and 35.1 per cent big farmers have used recommended quantity of 4,000 kg to 5,000 kg farm yard manure to cotton. For maize crop, 21.0 per cent small, 19.3 per cent medium and 11.7 per cent big farmers have used the recommended quantity farm yard manure.

In the backward villages, 39.3 per cent small, 37.1 per cent medium and 35.3 per cent big farmers have used the recommended quantity of farm yard manure for cotton. For maize crop, 18.7 per cent small, 18.7 per cent medium and 10.5 per cent big farmers have adopted this practice.
From the above discussion it is clear that the adoption rate in this practice also becomes lesser and lesser as the size of holding becomes larger and larger. It is also found that large number of farmers in all size-groups, have used the recommended quantity of farm yard manure for cotton crop rather than for maize. Hardly few farmers have adopted this practice for maize crop. It is unfortunate that farmers of this region in particular and farmers of our country in general are using less farm yard manure for most of the inferior crops like maize, jawar, ragi, etc. As a result, output or yield per acre of these crops is very low as compared to the other superior crops. Moreover, it is also observed that the percentage of farmers adopting this practice by all size groups in the advanced villages is higher than the farmers of all size groups in the backward villages.

(vi) Plant Protection Sprays:

In the use of recommended plant protection sprays, medium farmers in the advanced villages are ahead in adopting this practice for both cotton and maize crops than small and medium. 54.3 per cent medium, 51.3 per cent big and 48.6 per cent small farmers have used recommended doses of 8 sprays for cotton. For maize crop 38.7 per cent medium, 35.2 per cent big and 31.5 per cent small farmers have adopted this practice.
In the backward villages, it is found that big farmers are ahead in adopting this practice for cotton and whereas in case of maize it is the medium farmers. 33.3 per cent big, 31.5 per cent medium and 27.2 per cent small farmers have applied recommended doses of 8 sprays for cotton. For maize, 28.1 per cent medium, 26.3 per cent big and 25.0 per cent small farmers have applied the recommended doses of sprays.

This analysis leads us to believe that medium farmers are ahead of the small and big farmers in adopting this practice in both the groups of villages.
APPENDIX TABLE 7.1

Extent of Adulterated Seeds Received by the Farmers

<table>
<thead>
<tr>
<th>Farmer</th>
<th>Nature of Villages</th>
<th>Cotton</th>
<th>Wheat</th>
<th>Maize</th>
<th>Jawar</th>
<th>Cotton + Wheat</th>
<th>Cotton + Maize</th>
<th>Cotton + Jawar</th>
<th>Wheat + Maize</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
<td>(8)</td>
<td>(9)</td>
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<tr>
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<td>(14.2)</td>
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<td>-</td>
<td>(27.1)</td>
<td>(7.1)</td>
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<tr>
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<td>3</td>
<td>1</td>
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<td>2</td>
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<td>(5.5)</td>
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<td>1</td>
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<td>(9.0)</td>
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<td>(16.1)</td>
<td>(9.0)</td>
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<td>(9.0)</td>
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<td>(56.2)</td>
<td>(12.5)</td>
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<td>(4.7)</td>
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<tr>
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<td>(16.6)</td>
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<td>(4.7)</td>
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<td>(9.5)</td>
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</tbody>
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Source: Primary data based on the field work.

Notes: Figures in the brackets are the percentages of the respective rows.