CHAPTER XI

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The "Study of Production Finance for High Yielding Varieties Programme in IADP District Aligarh (U.P.)" was undertaken during the year 1970-71. The main purpose behind the selection of this problem was to ascertain the production credit requirements of farmers on account of rapid spread of the high yielding varieties in IADP district Aligarh. It is well established a fact that cultivation of high yielding varieties requires huge outlay in the form of cash-inputs like inorganic manures, purchased seeds, pesticides and hiring of labour (human and bullock) and machinery. The huge outlay on these input items has naturally, its repercussion on the production credit requirements. Moreover, due to short duration of these crops, the multiple cropping also came into being simultaneously with the introduction of high yielding varieties programme and it furthered the acquisition of tractor and other heavy machinery which increased the size of farm business and, as such, the production credit requirements reached a new high level.

However, the impact of high yielding varieties on farm income and savings has, nevertheless, gone unnoticed. Several studies came out testifying these facts and the banking institutions tapped-up an unprecedented deposits from rural and unbanked areas. These two aspects have brought the programmers and policy makers of the country in a mess and there is a growing need to ascertain the production credit requirements against the background of self financing as well.
as the loan advanced through multi-agency-approach to cater to the
ever increasing credit needs. Besides, the capital productivity, be
it from borrowings or otherwise, and economic rationale of production
credit use are other aspects which merit attention. It is these and
other aspects which have been examined here in order to create a
homogenous thinking among policy makers and planners of the country.

The experimental design of the study was multistage-stratified
purposive-random-sampling in which the selected cultivators were the
ultimate unit. A total of three Blocks was selected purposively
representing each agro-climatic zone of the district where there was
maximum advance of per hectare production credit from two institution
agencies, viz. Co-operatives and Government taccavi. Since
Commercial Banks did not lend any case during the reference period
(i.e. 1970-71), therefore, there was no any consideration of their
representation. As regards selection of villages, they were 10 in
numbers from the above three Blocks where the cultivators were
categorised into borrowers and non-borrowers. From each selected
village, ten borrowers and five non-borrowers were selected
proportionately from the three size groups in the villages, i.e.
0.0-2.5 hectare (small), 2.5-5.0 hectare (medium) and 5.0 and above
hectare (large). Thus, the total number of randomly selected
cultivators from the ten selected villages was 100 borrowers and 50
non-borrowers.

District Aligarh has an annual rainfall of 66 cm which shows
a great deal of variation, the coefficient of which was calculated
at 35.38 per cent for the last five years (i.e. 1966-67 to 1970-71).
With a total population of 21,13,747 persons (according to 1971
Census) it has 5,02,811 hectares of total geographical area. Out of
this total geographical area, 3,83,378 hectares are under cultivation accounting for 77.23 per cent and leaving very limited scope for further extension of area under cultivation. The cropping intensity of the district was recorded at 152.86 per cent, which was fairly distributed over different important kharif crops like bajra and maize and rabi crops like wheat, barley and gram. The district enjoys good irrigation facilities (82.25 per cent to the net cultivated area).

As regards high yielding varieties programme in the district, a total of 1,96,406 hectares was devoted to high yielding varieties which came to 33.08 per cent to the total cropped area. Out of these high yielding varieties, wheat had the largest coverage. The off'take of inorganic manures in 1970-71 was observed as 13.07 : 4.26 : 2.00 kg per hectare for N, P and K respectively, which was far below the total requirements for the cultivation of high yielding varieties. Only about 121 thousand hectares of crops were treated with pesticides, indicating thereby a low confidence in it. A review of the farm financing institutions of the district also reveals that only a total of Rs. 1,23,41 thousand was made available through co-operatives as short-term credit. A sum of Rs. 2,20,46 thousand was also made available through taccavi for the purchase of seeds, fertilizers and pesticides. The disbursement of production credit through commercial banks has not gained momentum so far. The Canara Bank which is the 'lead bank' for district Aligarh, has opened only four branches - one each at Bilaiagarh, Gonda, Hathras and Aligarh as late as September, 1973, when the last round of the survey was made. Surprisingly enough,
it had not financed even a single case as 'crop loan' in the year of investigation, i.e. 1970-71. However, it has put Rs. 25,000.00 loan limit for each branch which may be outstanding at a time. The other two banks, viz. Allahabad Bank and Central Bank of India, finance through co-operative credit societies.

The analysis of the structure of the sample farms indicated that distribution of cultivated area under different size groups was not even. In the case of borrowers' farms, 18.92 per cent of the total cultivated area was held by 47.00 per cent of small farms (viz. 0.0-2.5 hectare) families. Contrary to this, 43.42 per cent of the total cultivated area was occupied by merely 18.00 per cent of large farms (viz. 5.0 and above hectare) families. The rest was distributed over medium farms (viz. 2.5-5.0 hectare) families. Similarly, in the case of non-borrowers also, the pattern of distribution was in the following order - small farms (viz. 0.0-2.5 hectare) constituting 52.00 per cent of the rural farm families occupied only 24.01 per cent, medium farm (viz. 2.5-5.0 hectare) constituting 36.00 per cent of the rural households held 42.94 per cent and large farms (viz. 5.0 and above hectare) adding to the tune of merely 12.00 per cent to the total rural households kept under their possession the rest of the cultivated land (i.e. 32.05 per cent). The average size of farms for borrowers and non-borrowers was observed as 3.40 hectares and 3.03 hectares respectively. 69.88 per cent family members of borrowers and 66.95 per cent family members of non-borrowers work on their farms making
an average per hectare availability of 1.21 and 1.31 members respectively on the two categories of farms. The per hectare availability of family labour declines with the increase in the size of farms while it was reverse when per farm analysis was made.

The per farm availability of the number of bullocks was 2.84 and 2.42 for borrowers and non-borrowers respectively, commanding an average of 2.41 and 2.50 hectares of cultivated area by each pair of bullocks for the above two categories of farms. The corresponding figures for the availability of the number of milch cattle was worked out at 2.57 and 2.40 respectively for borrowers and non-borrowers. Availability of number of bullocks as well as that of milch cattle both was more on larger farms than on the lower ones. The per farm investment in the form of fixed capital including land was worked out to Rs. 48,379.76 for borrowers which ranged from Rs. 20,405.38 on the small size group (viz. 0.0-2.5 hectare) to Rs. 1,14,630.03 on the large one (5.0 and above hectare). In the case of non-borrowers, the per farm investment (including land) was calculated to Rs. 42,008.02 which also ranged from Rs. 20,101.02 on the small size group (viz. 0.0-2.5 hectare) to Rs. 1,07,669.61 on the large one (viz. 5.0 and above hectare). When reduced to per hectare basis, the overall investment came to Rs. 14,229.33 and Rs. 13,364.04 respectively for borrowers and non-borrowers. Here it varied from Rs. 14,894.45 on the small size group (viz. 0.0-2.5 hectare) to Rs. 13,692.20 on large size group (viz. 5.0 and above hectare) in the case of former and from Rs. 14,357.88 on small size group (viz. 0.0-2.5 hectare) to
Rs. 13,292.55 on the large size group (viz. 5.0 and above hectare) in the case of latter. Thus, it is seen that on per hectare basis, the investment in the form of fixed capital (including land) decreases with the increase in the size of farms in both the categories (i.e. borrowers and non-borrowers).

However, when the pattern of investment in the form of fixed capital was reviewed excluding land, a different picture came to sight. In the case of borrowers, the per hectare overall investment in the fixed capital (excluding land) was noticed to the tune of Rs. 2,712.66 which was lowest on the small size group (viz. 0.0-2.5 hectare) accounting for Rs. 2,611.97 and highest on the large size group (viz. 5.0 and above hectare) accounting for Rs. 2,844.06. In the case of non-borrowers, the overall investment was worked out to Rs. 1,982.27 which ranged from Rs. 1,837.88 on the small size group (viz. 0.0-2.5 hectare) to Rs. 2,223.41 on the large one (viz. 5.0 and above hectare). This indicated the general prosperity of larger farms against their lower counterparts. Further, it was also noticed that the borrowers invested 53.56 per cent more in the form of irrigational assets, implements and machinery and live-stock etc.

The analysis of cropping pattern and cropping intensity has reflected that the area devoted to cereals is lesser on large farms and vice-versa. But the larger farms devote much area to wheat and bajra, while the smaller ones devoted more to maize, paddy and jowar. As regards the area under high yielding varieties in case of borrowers, it was 31.58 per cent to the total cropped area on small size farms.
(viz. 0.0-2.5 hectare) and 38.03 per cent on the large size farms (viz. 5.0 and above hectare). In the case of non-borrowers also, it was noticed at 25.39 per cent and 29.96 per cent respectively for the above two categories. As regards medium size group (viz. 2.5-5.0 hectare), it stood in the mid of the above two figures for each category (i.e. borrowers and non-borrowers), showing that as the size of farms increases, the area under high yielding varieties also increases. Similarly, when compared between borrowers and non-borrowers, the former was found resorting to more high yielding varieties crops (35.55 per cent to the gross cropped area) than the latter (resorting to 28.02 per cent to the total cropped area). It was also noticed that hybrids of bajra and maize and high yielding varieties of wheat were more common in larger farms than in the lower ones and on the borrowers farms than those of non-borrowers. This clearly signifies that availability of production finance is the major source for adoption of high yielding varieties and also for hybrids of bajra and maize and HYV of wheat. This view was again held when cropping intensity and types of crops grown by different sizes and categories of farms were reviewed. The cropping intensity on larger farms and particularly on borrowers farms was higher than on the lower ones (with an exception of large size group, viz. 5.0 and above hectare on borrowers farms). The overall cropping intensity on borrowers farms was 170.44 per cent while it was 145.43 per cent on the non-borrowers farms. Moreover, the larger farms were found growing more crops like wheat and bajra
while the smaller ones grow more like jowar and bejhar.

The study on costs and returns brought to light some more useful informations. It was examined broadly into two heads. The first part of the study dealt with the analysis of farm economy and as such it examined in details the level of input, output, family labour income and farm business income and input-output ratios from crop production as a whole and milk production collectively and separately and also that of high yielding varieties only. In the second part, the study analysed at the micro level and in this section enterprise analysis of different high yielding varieties crops and their local counterparts were examined. The costs and returns from milk cattle per lactation per cow and buffalo were also examined.

In the case of borrowers, the overall per farm values of input, output net income, family labour income and farm business income were worked as Rs. 7,732.46; 13,590.21; 5,857.75; 6,846.71 and Rs. 8,902.93 respectively. The input-output ratio calculated was 1:1.76. The values of net income like other measures of farm profit tended to rise with increase in the size of farms. It was Rs. 1,716.54 on small size group (viz. 0.0-2.5 hectare) which increased to Rs.15,905.7 on large size group (viz. 5.0 and above hectare). Similarly in the case of non-borrowers also, the per hectare overall values of input, output, net income, family labour income and farm business income were worked out as Rs. 5,581.86; 8,550.20; 2,968.34; 3,658.62 and Rs. 5,444.12 respectively with input-output ratio of 1:1.53. As regards per farm variation in net income, it was seen that while
small farms (viz. 0.0-2.5 hectare) obtained it to the tune of Rs. 1,061. It was in the order of Rs. 9,674.42 for the large farms (viz. 5.0 and above hectare). It was again noticed that borrowers have incurred 38.53 per cent more expenditure and obtained 97.34 per cent more net income. When reduced to per hectare basis, the overall values of input and output came to Rs. 2,274.27 and Rs. 3,997.12 respectively for the borrowers deriving an average net income of Rs. 1,722.85 per hectare. Likewise, the value of net income came to Rs. 979.65 only after incurring a sum of Rs. 1,842.20 per hectare in the forms of input factors. It ranged from Rs. 1,252.95 on small farms (viz. 0.0-2.5 hectare) to Rs. 1,937.37 on large farms (viz. 5.0 and above hectare) in the former case and from Rs. 757.86 to Rs. 1,194.37 respectively on the above two size groups of farms in the case of latter. This indicated that there is a close and positive association between net income per hectare and size of farm.

When the cost of input factor was examined, it was seen that the overall input costs rose from Rs. 1,988.31 on small farms (viz. 0.0-2.5 hectare) to Rs. 2,391.18 on large farms (viz. 5.0 and above hectare) in the case of borrowers and from Rs. 1,647.53 on small farms (viz. 0.0-2.5 hectare) to Rs. 2,024.36 on large farms (viz. 5.0 and above hectare) in case of non-borrowers. As regards allocation of the total input costs, it was obtained as human labour (25.44 per cent), rental value of land (23.74 per cent), bullock labour (19.62 per cent), manures and fertilizers (9.55 per cent), irrigation charges (7.17 per cent), seed (6.56 per cent) and overhead charges (4.81 per cent) in the case of borrowers and rental value of land (29.87 per cent).
human labour (22.61 per cent); bullock labour (21.23 per cent); manures and fertilizers (6.33 per cent); overhead charges (6.20 per cent); irrigation charges (5.51 per cent) and seeds (5.43 per cent) in the case of non-borrowers. This reveals that the borrowers are more conscious of putting in their resources in more rational manner. It is worth mentioning that on the borrowers farms, all input items go on increasing with the increase in the size of farms except those of rental value of land and bullock labour, which go on decreasing. Similarly, on the borrowers farms also, all input items increase with the increase in the size of farms with the exception of the rental value of land, bullock labour and human labour which show a declining trend with the rise in the farm sizes.

As regards per hectare net income from milk enterprise, it came to Rs. 108.02 on the borrowers farms and Rs. 111.50 on the non-borrowers'. However, unlike crop enterprise, in both the cases (borrowers and non-borrowers), it showed a decreasing trend with the increase in the size of farms. The other measures of farm profit, viz. values of output, family labour income and farm business income also follow the same suit. They also indicate that there is no any difference between borrowers and non-borrowers in milk enterprise with regard to income obtained from it.

When the income from crop and milk enterprises was clubbed together, the overall per hectare value of net income rose to Rs. 1,830.87 ranging from Rs. 1,386.78 on small size group (viz. 0.0-2.5 hectare) to Rs. 2,021.90 on the large size group (viz. 5.0 and
above) in case of borrowers. Similarly, the overall per hectare values of input, output, family labour income and farm business income came to Rs. 2,636.21; 4,467.08; 2,157.84 and Rs. 2,766.47 respectively which tended to rise with an increase in the size of farms. In the case of non-borrowers, the overall per hectare value of net income was worked out to Rs. 1,091.15, which was also minimum to the tune of Rs. 886.20 on small farms (viz. 0.0–2.5 hectare) and maximum of Rs. 1,283.62 on large farms (viz. 5.0 and above hectare). The per hectare average values of input, output, family labour income and farm business income were of the order of Rs. 2,223.44; 3,314.59; 1,365.89 and Rs. 1,960.24 respectively. All these figures showed an increasing trend with the increase in the size of farms. The input-output ratios for borrowers and non-borrowers farms came to 1:1.69 and 1:1.49 respectively.

The farm business analysis of high yielding varieties alone on per farm basis brought out that, on an average, the borrowers farms obtained a net income of Rs. 3,148.84 which was lowest (Rs. 956.06) on small farms (viz. 0.0–2.5 hectare) and highest (Rs. 8,336.75) on large farms (viz. 5.0 and above hectare). The overall values of output, family labour income and farm business income came to Rs. 6,786.15; 3,552.77 and Rs. 4,193.49 respectively. When reduced to per hectare basis, the above values came to Rs. 5,329.13; 2,789.96 and Rs. 3,294.17 respectively. The overall value of net income was worked out to Rs. 2,472.76 which also ranged from Rs. 2,054.6 on small farms (viz. 0.0–2.5 hectare) to Rs. 2,744.67 on large farms.
(viz. 5.0 and above hectare). The average input-output ratio came to 1:1.87.

In the case of non-borrowers, the overall per farm values of input, output, net income, family labour income and farm business income came to Rs. 1,997.07; 3,439.60; 1,442.53; 1,741.22 and Rs. 2,101.41 respectively. The per farm values of net income for small (viz. 0.0-2.5 hectare), medium (viz. 2.5-5.0 hectare) and large (viz. 5.0 and above hectare) farms came to Rs. 394.09; 1,854.49 and Rs. 4,749.84 respectively. On per hectare basis, the distribution for the above three sizes obtained was Rs. 1,193.52; 1,799.34 and Rs. 2,081.72 respectively, while the overall per hectare values of input, output, net income, family labour income and farm business income came to the tune of Rs. 2,438.67; 4,200.17; 1,761.50; 2,126.24 and Rs. 2,566.06 respectively. The input-output ratio came to 1:1.72.

In the case of borrowers, the pattern of input utilization for high yielding varieties was in the order of human labour (21.57 per cent); manures and fertilizers (19.61 per cent); bullock labour (18.35 per cent); rental value of land (14.46 per cent); irrigation charges (8.29 per cent) and seed (7.77 per cent). The other input items, viz. overhead charges, tractor and machinery charges and that on pesticides accounted for 6.23 per cent; 3.03 per cent and 0.69 per cent respectively. The small farms (viz. 0.0-2.5 hectare) put in more proportion of their total expenditure on bullock labour and rental value of land than those of large one (viz. 5.0 and above hectare). In case of non-borrowers, the pattern of input use was
of the order of - human labour (22.60 per cent); bullock labour (21.49 per cent); rental value of land (17.58 per cent); manures and fertilizers (15.96 per cent); irrigation charges (7.68 per cent) and seed (6.75 per cent). The other input items, viz. overhead charges, implements and machinery charges and the cost on pesticides came to the tune of 5.94 per cent; 1.28 per cent and 0.72 per cent respectively.

Here, the small farms (viz. 0.0-2.5 hectare) involved more expenditure on human labour, bullock labour and rental value of land than those of large one (viz. 5.0 and above hectare).

Among all the crops of high yielding varieties the hybrid bajra gave the highest per hectare net income of Rs.1,873.98, followed by high yielding varieties on wheat (Rs.1,541.44) and hybrid maize (Rs.1,358.42) on the borrower's farms. In the case of non-borrowers farms, the high yielding varieties of wheat gave the highest per hectare net income of Rs.1,671.32 followed by hybrid maize (Rs.1,088.80 which was also closely followed by hybrid bajra (Rs.1,080.44).

However, in the case of borrowers, the highest input-output ratio was obtained for hybrid bajra (1 : 2.59), followed by hybrid maize (1 : 2.15) and high yielding wheat (1 : 1.83). On the non-borrowers farms also, the input - output ratio was highest in the case of hybrid bajra (1:2.34), followed by hybrid maize (1:1.83) and high yielding varieties of paddy (1:1.72). Among local varieties on the borrowers farms, wheat crops gave the highest net income (Rs.1,239.41), followed by paddy (Rs.892.96) and maize (Rs.836.23). The corresponding input-output ratios came to 1:1.53; 1:1.25 and
1:1.44 respectively justifying a better return by local wheat. On the farms of non-borrowers also, the net income was highest in wheat (Rs. 1,182.09), followed by paddy (Rs. 897.93) and maize (Rs. 820.65). The input-output ratios for the above three crops were 1:1.46; 1:1.24 and 1:1.32 respectively. Thus, hybrid bajra and local wheat are found to be profitable amongst different high yielding and local crops respectively.

The overall per farm values of production finance costs which covered the costs incurred on (a) hired labour (human and bullock) and machinery, (b) seeds (c) manures and fertilizers and pesticides (which includes insecticides, fungicides and weedicides) and (d) irrigation were worked out to Rs. 3,015.57 for all crops and Rs. 1,821.5 for high yielding varieties only on the borrowers farms. The former deviated from Rs. 651.87 on small farms (viz. 0.0-2.5 hectare) to Rs. 9,267.31 on the large farms (viz. 5.0 and above hectare) while the latter differed to the extent of Rs. 478.93 on small farms (viz. 0.0-2.5 hectare) to Rs. 5,030.35 on large farms (viz. 5.0 and above hectare)

In the case of all the crops, the production finance cost comprised of 39.00 per cent of the total costs on the farm which rose to 50.08 per cent for high yielding varieties only. In the case of non-borrowers also, the total amount of production finance cost came to Rs. 1,694.63 for all crops and Rs. 818.23 for high yielding varieties only. The above two figures comprised of 30.35 per cent and 40.097 per cent respectively to the total farm costs. Like borrowers farms, in the case of non-borrowers farms also, it ranged from Rs. 521.21 on small farms (viz. 0.0-2.5 hectare) to Rs. 6,450.85 on large farms (viz. 5.0
and above hectare) in case of all the crops and from Rs. 265.36 on small farms (viz. 0.0-2.5 hectare) to Rs. 3,055.97 on large farms (viz. 5.0 and above hectare) in the case of high yielding varieties only.

The real situation emerged when the level of production finance cost was analysed on per hectare basis, which, on an average, came to Rs. 886.93 for all crops and Rs. 1,388.13 for high yielding varieties only on borrowers farms. The per hectare values for small (viz. 0.0-2.5 hectare); medium (viz. 2.5-5.0 hectare) and large farms (viz. 5.0 and above hectare) came to Rs. 475.82; 847.58 and Rs. 1,098.58 respectively for all crops and Rs. 1,027.76; 1,339.24 and Rs. 1,656.93 respectively for high yielding varieties only. For non-borrowers farms, the average values of production finance cost for all crops and that for high yielding varieties only came to Rs. 570.83 and Rs. 1,075.70 respectively. It came to the tune of Rs. 373.34; 499.97 and Rs. 796.40 in the case of all crops and Rs. 805.18; 1,013.21 and Rs. 1,339.34 in the case of high yielding varieties only for small (viz. 0.0-2.5 hectare); medium (viz. 2.5-5.0 hectare) and large (viz. 5.0 and above hectare) farms respectively.

The total production finance cost was distributed in the order of hired labour (human and bullock) and machinery (39.83 per cent); manures and fertilizers and pesticides (24.91 per cent); irrigation charges (18.39 per cent) and cost of seeds (16.81 per cent) when all crops were examined on the borrowers farms. It was seen that small farms (viz. 0.0-2.5 hectare) put in more expenditure to the tune of
34.43 per cent on manures and fertilizers and pesticides while for hired labour (human and bullock) and machinery, they incurred only 18.28 per cent to the total production finance cost. This was due to more availability of family labour on these farms. In the case of non-borrowers, the components of production finance cost for all crops obtained were: hired labour (42.35 per cent); manures and fertilizers and pesticides (21.45 per cent); irrigation charges (18.14 per cent) and cost of seeds (18.06 per cent). Here unlike borrowers, the small farms (viz. 0.0-2.5 hectare) put in more expenditure on hired labour (human and bullock) and machinery, i.e. 41.11 per cent while for manures and fertilizers and pesticides, it came to the tune of 15.16 per cent only. The share of different components of production finance cost in the case of high yielding varieties was: manures and fertilizers and pesticides (41.76 per cent); hired labour (human and bullock) and machinery (25.19 per cent); irrigation charges (17.06 per cent) and cost of seeds (15.95 per cent) for borrowers' farms. In this case also the requirement of hired labour (human and bullock) and machinery on small farms (viz. 0.0-2.5 hectare) was found to be minimum (15.47 per cent) when compared to those incurred on manures and fertilizers and pesticides (46.13 per cent). In the case of non-borrowers also, the pattern of distribution was of the order of: manures and fertilizers (37.80 per cent); hired labour (human and bullock) and machinery (29.49 per cent); irrigation charges (17.41 per cent) and cost of seeds (15.30 per cent). Ironically enough, the small farms (viz. 0.0-2.5 hectare) in this category were found to be
incurring 38.55 per cent on hired labour (human and bullock) and machinery, which was higher than any component in any size of the farms under this category because they did not find it profitable to stay at their own farms due to meagre resources and lesser cropping intensity and overall, the smaller size of farm business.

The level of output as indicated by gross and net returns, has already been examined on the borrowers and non-borrowers farms and also on the different size of farms. However, it may be mentioned here that when all crops were examined together, the borrowers farms obtained as high as 58.95 per cent and 97.34 per cent respectively more income over the gross and net incomes obtained by the non-borrowers farms. The same in the case of high yielding varieties were of the order of 97.25 and 118.29 per cent respectively over the non-borrowers farms.

The per hectare analysis also confirmed that the gross and net returns were significantly higher on the borrowers farms either for all crops combined or for high yielding varieties only, which was of the order of Rs. 3,997.12 and Rs. 1,722.85 for all crops and Rs. 5,329.19 and Rs. 2,472.76 for high yielding varieties only in the case of borrowers and Rs. 2,821.85 and Rs. 979.65 and Rs. 4,200.17 and Rs. 1,761.56 respectively for non-borrowers farms.

When all crops were taken together, the borrowers farms provided an average annual employment of 575 days ranging from 192 days on small farms (viz. 0.0-2.5 hectare) to 1,470 days on large farms (viz. 5.0 and above hectare). The non-borrowers farms, on the other hand, created an annual employment of 370 days, ranging from 162 days on
small farms (viz. 0.0-2.5 hectare) to 1,029 days on large farms (viz. 5.0 and above hectare). In case of high yielding varieties only, the annual employment was 226 days on borrowers farms and 129 days on the non-borrowers farms. However, the high yielding varieties have a little more employment potential than those of all crops taken together.

It was analysed that for all crops combined, Rs. 49.45, 35.34 and Rs. 30.65 worth of production credit was needed for small (viz. 0.0-2.5 hectare), medium (viz. 2.5-5.0 hectare) and large farms (viz. 5.0 and above hectare) respectively for Rs. 100.00 worth of expenditure on yield boosting inputs like manures and fertilizers, pesticides and seeds. As regards high yielding varieties only, the above figures stood at Rs. 59.26, 44.05 and Rs. 40.47 respectively for the above three size groups. It was further noticed that Rs. 316.10 worth of production finance was additional resource due to borrowings, while Rs. 115.97 was in the form of other costs (fixed cost and other variable costs). In the case of high yielding varieties only, they were Rs. 312.43 and Rs. 105.32 respectively. Here it was observed that medium size farms (viz. 2.5-5.0 hectare) had the highest resource generalization potential both for all crops and that for high yielding varieties only. They were of the order of Rs. 347.61 and Rs. 326.03 in the form of production finance for the above two heads. This was due to better resource coordination ability of this size group.

It was seen that large farms (viz. 5.0 and above hectare) and medium farms (viz. 2.5-5.0 hectare) had more additional resource at their command in the form of labour (human and bullock) and machinery
(45.46 per cent and 36.51 per cent respectively), while the small one (viz. 0.0-2.5 hectare) did it in the form of manures and fertilizers and pesticides (103.73 per cent). However, the picture was different for high yielding varieties, where small (viz. 0.0-2.5 hectare) and medium (viz. 2.5-5.0 hectare) farms obtained more additional resources in the form of manures and fertilizers and pesticides, while it was in the form of hired labour (human and bullock) and machinery on the large farms (viz. 5.0 and above hectare). The additional net income was worked out to Rs. 743.20 in the case of all crops and Rs. 711.20 for high yielding varieties only indicating that there was limited scope for more expansion of high yielding varieties and it would be a disquieting trend for future planning. The overall, ratio between production credit and net income came to 1:5.56 which was highest (1:5.96) on medium size farms (viz. 2.5-5.0 hectare) and lowest (1:3.65) on small farms (viz. 0.0-2.5 hectare).

The functional analysis was carried out in order to establish association between the level of production credit and the use of capital inputs and those with owned production fund and use of capital inputs. In the next step, it was used to ascertain the marginal productivity of different important inputs, in general, and credit, in particular, so that inference may be drawn regarding rationale of production credit uses. In all, one linear and six Cobb-Douglas production functions were retained for the final inclusion in the result. The general form of two functions were of the following nature:
Linear: \[ Y = a + b_1X_1 + b_2X_2 + \ldots + b_nX_n \]

Cobb-Douglas: \[ Y = aX_1^{b_1}X_2^{b_2} \ldots X_n^{b_n} \]

When the regression of production credit on the level of capital input use was examined, it was observed that manures and fertilizers (X5) and irrigation charges (X7) were positively associated and highly significant, while the expenditure on human labour (X1) showed a negative and significant relationship with production credit.

The equations obtained were of the following order:

\[
P.C. = 41.47 - 0.1803X_1 + 0.4524X_5 + 0.4869X_7 \\
(0.0693) \quad (0.1115) \quad (0.1247)
\]

\[
R^2 = 0.86 \quad n = 100 \quad \overline{R}^2 = 0.7202 \quad F = 37.33
\]

(Figures in parentheses are standard errors (S.E.) and starred figures just above them are the regression coefficients)

P.C. = Production credit

* Significant at 5% level of significance
** Significant at 1% level of significance.

The regression of owned production fund (O.P.F.) revealed that hired human labour (X1), hired bullock labour (X2), tractors and machinery charges (X3) and costs on seeds (X4) had positive and highly significant relationships with those of owned production fund (O.P.F.) in the case of borrowers while in the case of non-borrowers, the positive and significant relationships were seen in tractor and machinery charges (X3) & costs on seeds (X4) and irrigation charges (X7). The equations were of the following form:
Borrowers:

\[ 0.0178 \times 0.0170 \times 0.0165 \times 0.9391 \]

\[ R^2 = 0.91 \quad n = 100 \quad R^2 = 0.8150 \quad F = 63.31 \]

Non-borrowers:

\[ 0.0209 \times 0.0051 \times 0.0763 \times 0.0140 \]

\[ R^2 = 0.96 \quad n = 50 \quad R^2 = 0.8941 \quad F = 70.53 \]

(Figures in parentheses are standard errors (S.E.) and starred figures just above are the regression coefficients).

0.P.F. Owned production fund.

** Significant at 1% level of significance.

As regards marginal value product of different important input factors, it was Rs. 7.92 for irrigation, manures and fertilizers; Rs. 1.80 for pesticides and Re. 0.38 for human labour for each rupee investment on the above factors on borrowers farms. On the non-borrowers farms, on the other hand, it was Rs. 8.91 for irrigation, manures and fertilizers, Rs. 5.96 for pesticides and Rs. 1.53 for tractor and machinery charges for each rupee of investment on these farms. This indicated that there was a greater scope for augmenting more resources in the form of irrigation, manures and fertilizers and pesticides on both the farm categories and on tractor and machinery on the non-borrowers farms. Similarly, the analysis of marginal value product of production credit revealed that it had a total of Rs. 4.71 MVP for each rupee of advances in the form of production credit. The
owned production fund (O.P.F.) gave the MVP of Rs. 3.50 on the borrowed farms and Rs. 6.14 on the non-borrowers farms for the same level of investment. It is, therefore, concluded that advances of production credit be stepped up and the farmers should divert more of their owned production fund on above input items where it is increasingly productive.

For obtaining an optimum level of input use, it was worked out that the farmers should employ Rs. 262.00 in the form of hired human labour, Rs. 2131.00 in the form of irrigation, manures and fertilizers and Rs. 139.00 on pesticides on their farms as against an existing level of Rs. 999.00, 1,394.00 and Rs. 8.00 respectively on the above three inputs. In such a situation, Rs. 1,322.00 were worked out as the credit requirements for an average farm and Rs. 383.82 per hectare. A sum of Rs. 11,61,22 thousand was worked out as the credit gap between demand for and supply of production credit for the district during 1970-71.

Finally, the study brings forth to the surface the following suggestions in order to improve the efficiency of the farm resources in the area. However, a word of caution is required here. During last few years, the Indian economy, in general, and rural economy in particular, have been more inflationary and the suggestions based on the generalization of this study are likely to change substantially during the years to come. Even then, the conclusive remarks of the study will not go unheeded.

1. The borrowings should be made restricted to the kind components of input factors among which two capital inputs, viz. manures and fertilizers and pesticides should get top priority. It is advisable
on the part of loaning agency to pay electric bills of irrigation etc. which would ensure the effective recovery of the loan due to their higher productivity.

2. The supply of production credit should be stepped up at least to a new level of Rs. 15,10,10 thousand and should be made available to each size group without any prejudice to the area commanded by them. It would provide ample opportunity to bring at least the large farms (viz. 5.0 and above hectare) under the scope of agricultural income tax. In the absence of borrowings, the farm income falls substantially. Moreover, on the small farms (viz. 0.0-2.5 hectare), the borrowings provide opportunity of employment by increasing the cropping intensity and resorting to High Yielding Varieties Programme. As regards medium farms (viz. 2.5-5.0 hectare), it has the highest productivity and, thus, justifying the enhancement of the level of its use on these farms.

3. The Commercial banks, particularly the Canara Bank, which is the 'Lead Bank' for the district, should be served with a clear-cut instructions to lend crop loan fluently to agriculture by lifting the Rs. 25,000.00 outstanding limit for a branch.

4. There is a need for an intensive approach to meet the production credit requirements of each farm family which may be covered through three institutional agencies, viz. Co-operative, Government and Commercial Banks, operating in the area. In absence of such efforts the farming of the area will be lesser productive for those farms who do not resort to borrowings as the productivity of land and
family labour on these farms are tied with the use of production credit.

5. There is need to tap-up rural savings by opening of more branches in the rural area in order to curb the use of owned production fund (O.P.F.) in such inputs the productivity of which is at stake. Contrary to this, there should be a provision to advance loan to small farms (viz. 0.0-2.5 hectare) for consumption purposes provided they are ready to work on their farms because the marginal productivity of family labour was much higher than its factor cost, while it was lesser for hired human labour.

6. The additional investment of resources on high yielding varieties do not give more farm income when compared to those obtained from all crops combined. This is a very disquieting trend and would adversely affect the spread of high yielding varieties in the coming years. And, therefore, there is a growing need to revise the procurement and support price policy keeping in view the recent 'cost-price squeeze' in the foodgrain crops which are mostly for high yielding varieties.

7. The supply of manures, fertilizers and pesticides should be stepped up to a new level if the present stagnation in the agricultural production is to be broken and High Yielding Varieties Programme was to assume a new dimension.

8. The acquisition of implements and machinery which shows a higher MVP should be promoted to high level of enable the farms in timely operations and to give new impetus to the multiple cropping
programme in the area.

9. The cultivation of hybrid bajra which gives more returns, should be encouraged at all costs. The other important crop amongst high yielding varieties is wheat which comes next to bajra with regard to farm income. Thus, the hybrid bajra and high yielding varieties of wheat-crop rotation should be resorted to enhance the resource efficiency of the farms in the area.

10. The dairy industry which is complementary to the crop production, is not seen productive when compared to the farm income obtained from the crop enterprises in the area. Therefore, the reasons behind the low productivity of dairy enterprises need thorough investigations in order to bring it at least at par with crop production.

Keeping the generalization and suggestions of this dissertation in view, it is recommended that a Sound Production Credit System should be organised to catch-up with the wind of technological changes in the country. This system should, on one hand, deal with supply of crucial inputs and, on the other, should encourage deposits from the rural community by allowing higher rates of interest.

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