SUMMARY
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The present problem entitled "An Economic Inquiry of Slow Growth Crops in Distt. Hamirpur" has been undertaken in agricultural year 1994-95 to find out trend and fluctuation (variation) in area, production, productivity, correlation in between variation there with, level of implementation of modern technology of agriculture and to identify the constraints responsible for static production of slow growth crops (pulses, oilseed and course grain).

The study is based on 120 cultivators constituting 87 of 0-2 hect., 21 of 2-4 hect., and 12 of 4 hect. and above size group of holdings, randomly selected from 12 villages of two blocks viz. Rath and Gohand of the district Hamirpur. Survey method was used to collect primary data through personal interview of respondents. Secondary information have been noted from Agricultural Statistics diary of U.P. State and related offices of the district and blocks.

Out of the total geographical area of 418,476 hect., 43,601 hect. and 52,764 hect, 72.71 percent, 70.46 percent and 76.29 percent was under cultivation, in the district Hamirpur, block Rath and Gohand, respectively in 1994-95. The intensity of cropping in district and block Rath and Gohand in 1994-95 was 104.19, 113.74 and 104.83, respectively. There is uneven distribution of land among the cultivators in the district as the farmers upto 2 hect. farm size constituting 70.1 percent of the total number occupied only 30 percent of the land under cultivation against large farmers which are 8.5 percent in numbers occupied as much as 34.5 percent of the total land under cultivation in the district. The level of
fertilizer use in district Hamirpur was 16.87 kg Nitrogen, 9.10 kg Phosphate and 0.30 kg potash per hectare. The gross irrigated area as reported by the government offices during 1994-95 to the cropped area was 27.35 percent, 54.5 percent and 48.4 percent in district Hamirpur and block Rath and Gohand, respectively. Rainfall from June 1994 to May 1995 was 1042.18 mm. The main crops of the district are Jowar, Arhar, Moong, Urd, Soyabean, Til, Paddy, Wheat, Gram, Pea, Lentil, Mustard and Linseed having per hect. yield of 6.11 qt., 12.36 qt., 2.08 qt, 2.33 qt, 8.75 qt, 1.44 qt, 10.32 qt, 17.48 qt, 5.58 qt, 8.95 qt, 8.01 qt, 3.49 qt and 3.41 qt, respectively, contributing to 5.88, 5.63, 1.18, 2.28, 1.74, 1.83, 0.93, 28.09, 24.42, 15.38, 6.07, 1.62 and 3.97 percent of the total cropped area in district Hamirpur during 1994-95.

The average size of holding of the sample farmers was 2.096 hect., uneven distribution of land among various categories of holdings has been found in the studied sample, as small farmers of 0-2 hect. size group contributing to 72.50 percent in number occupied only 44.13% of the land under cultivation. On an average, 12.45 percent area was under irrigation varied from 10.08 percent on 4 hect. and above size group to 14.97 percent on the holdings of 0-2 hectare. The average size of family in the sample was 4.38 of which 67.35 percent were farm workers. On an average, 1.02 pairs of bullock and 0.13 tractor were maintained on a sample farm. The capital investment excluding the value of land per farm and per hect. was Rs. 164815.64 and Rs. 24279.69, respectively.

Jowar, Arhar, Moong, Urd, Til (seasam), Soyabean, Paddy in kharif, and Wheat, Gram, Pea, Lentil, Mustard, Linseed in Rabi were the main crops in the sample holdings. On an average, cropped area and cropping intensity was 2.282 hect. and 110.85 percent
respectively. Intensity of cropping showed slight increasing tendency with decrease in size of holdings.

Area under slow growth crops (pulses, oilseeds and course grain) to the cropped area on the studied holdings was 75.92 percent and showed no relationship with the size of holdings. On an average, pulses occupied 80.69 percent and 61.06 percent, oilseeds 6.99 percent and 5.29 percent, course grain 12.59 percent and 9.56 percent of the total area under slow growth crops and cropped area, respectively. Pea, Gram, Jowar, Lentil, Urd and Arhar were the major slow growth crops occupying 27.69, 17.48, 9.45, 7.67, 3.37 and 2.99 percent of the cropped area on the selected holdings respectively. The area under oilseed crops like mustard, linseed and til (seasum) to the cropped area on sample holdings was 1.14, 1.70 and 1.36 percent, respectively. Soyabean is newly introduced oil seed crop contributing to 1.10 percent of the cropped area in the sample.

Area under High Yielding Varieties of the slow growth crops, on an average, was 61.34 percent to their total area. Percentage area under HYVs of slow growth crop increases with an increase in size group of holdings.

A linear equation was fitted in the area, production, productivity of different slow growth crop in district Hamirpur for the period of 1970-71 to 1994-95.

The trend of area under Gram, Arhar, Til (seasam) and Jowar was decreasing. It was slightly increasing for Pea, Lentil, Mustard, Linseed, Moong, Urd and Soyabean. Since the area under other important crops like wheat and paddy and total cropped area during this period was static, the study reveals that area under Jowar, Arhar, Til has
shifted to Urd, Moong and Soyabean and area under gram to Pea, Lentil, Mustard and Linseed. However, the trend of area under slow growth crops was near to the static.

The decreasing trend in production during the same period for Jowar, Gram, Arhar, Til (seasam) were observed against the increasing trend for the production of Pea, Lentil, Urd, Moong, Mustard, Linseed and Soyabean. It showed that the direction of trend for the different slow growth crops is in accordance with their trend for area. The slight increasing trend in the productivity of all the slow growth crops was observed except in Soyabean and Lentil. It shows that area under these crops upto a greater extent was associated with their prices. The annual compound growth rate in the area under Gram, Jowar, Arhar and Til in Hamirpur district during 1970-71 to 1995-96 was 1.45419, 1.61979, 2.39288 and 3.71289. It was 19.86039 in Gram, 16.71735 in Moong, 14.83012 in Soyabean, 10.51290 in Lentil, 7.80377 in Urd, 5.21826 in Mustard and 4.64220 in Linseed. The annual compound growth rate for the production of different slow growth crops for the same period was like that of growth rate in area being -0.72306, 22.63136, 0.32687, 10.97213, 7.71828, -2.51740, 7.83677, -0.22551, 22.73006, 8.53139 and 14.59421 for the crops Gram, Pea, Arhar, Lentil, Mustard, Til (seasam), Linseed, Jowar, Moong, Urd and Soyabean, respectively. Slight increasing annual compound growth in the productivity of all the slow growth crops with the exception of Soyabean has been found for the same period in district Hamirpur.

Absolute fluctuation (variation) of original data of area, production and productivity from the trend value for the period of 1970-71 to 1995-96 for the district Hamirpur for the different slow growth crops did not showed any regular tendency.
However, in general it was positive for pre green revolution period (1970-71 to 1983-84) and negative in the post green revolution period (1984-85 to 1995-96). A change in nature of fluctuation was observed after every 3-4 years. Positive or negative fluctuation (variation) in area, production and productivity was generally continued only for 2-3 years for each of the slow growth crops.

The index number analysis taking 1970-71 as the basic year has also been made to know the variation in area, production and productivity of slow growth crops in district Hamirpur over the given period which shows a sharp decrease in the area of Gram, Arhar, Til and Jowar being an index number of 72.46, 53.34, 40.91, 74.21 in 1995-96, respectively. During the same period the index number of Pea, Soyabeen and Moong increased very sharply being 2695.34, 2557.89 and 2018.61, respectively. However, an increase in the index number of area under Lentil, Mustanrd, Linseed and Urd, taking 1970-71 as base year has also been observed. The nature of fluctuation (variation) in the production of all the slow growth crops for the same period in distt. Hamirpur was alike the area, being the index number in 1995-96 as 75.30, 3081.48, 92.15, 745.30, 386.12, 28.78, 392.67, 72.35, 2306.35, 466.03 and 2352.94 for Gram, Pea, Arhar, Lentil, Mustard, Til, Linseed, Jowar, Moong, Urd and soyabeen, respectively. The index number analysis regarding productivity of slow growth shows a slight increase (positive variation) for each of the crops during this period except a slight decrease in the productivity of Jowar, Soyabeen, Til and lentil.

To know the relationship between fluctuation (variation) in area, production, productivity of different slow growth crops with their prices and rainfall, a simple
correlation analysis has been made for the period of 1970-71 to 1995-96 for district Hamirpur. The analysis showed positive correlation between variation in area under Moong and Urd. The same relationship was observed in case of area under Paddy and Arhar, Soyabeen and Urd. Negative correlation in the area under Jowar and previous year rainfall was also found in the district Hamirpur. The area under Wheat and Gram was significantly negatively correlated with the area under other pulses, oilseeds, cultivated in Rabi season. Area under Gram did not showed any correlation with their prices and rainfall. But the area under Pea, Lentil was positively correlated with their prices and rainfall during the previous and current year with the exception of Soyabeen. The variation in production of Kharif crop was positively correlated in the level of production with rainfall and prices of Moong, Soyabeen and Til. Production level of Jowar, Arhar and Urd was negatively correlated with rainfall and prices. There was significant negative correlation in between the production of pulses and oilseeds cultivated in Rabi season with the production level of Gram. No significant correlation was observed in between the production of other pulses and oilseeds. The production of Gram and Mustard was negatively correlated with rainfall and prices of other competitive crops. Production of Pea and Lentil was significantly positively correlated with the rainfall and their prices.

The productivity of different crops, in general, was insignificatnly correlated except significant correlation in the productivity of Arhar, Til, Moong, Urd. Except significant negative correlation in between productivity of Arhar and Rainfall, productivity of none of the crop showed significant correlation with their prices and rainfall.
The analysis related to the extent of adoption of modern technology shows that, on an average, 61.56 percent of the area under slow growth crops was covered under HYVs. The bridgeable gap under HYV was minimum in Pea followed by Lentil being 15.63 percent and 24.34 percent of their total area, respectively. It was maximum in Jowar followed by Til (seasamum), Linseed, Mustard and Mong being 90.19, 90.00, 82.50, 72.00 and 70.27 percent of the area under respective crops on the selected holdings. Total area under Soyabean was exceptionally covered by high yielding varieties on all the farms, under study.

None of the field, covered by slow growth crops was found irrigated. The level of nitrogen application varied from 0.65 percent to 24.00 percent of the recommended dose with a minimum of 2.4 percent in Til (seasamum) and maximum of 30.63 percent in Pea of the recommended dose of Phosphate was applied in the production of slow growth crops. The expenses on plant protection chemicals, per hectare, varied from Rs. 1.80 to Rs. 58.05 on the sample holdings. The level of application of Nitrogen, Phosphorus and plant protection chemicals, per hectare, showed increasing trend with the increase in size of holdings. Poor implementation of modern technology of agriculture on slow growth crops in the form of area under HYV, irrigated area, application of fertilizers, rhizobium culture and plant protection measures is significantly visible if existing yield is compared with the recommend yields of the related crop. On an average only 42.62, 66.66, 31.15, 36.88, 55.85, 41.81, 57.86, 21.80, 27.92, 40.49 and 42.44 percent of the recommended yield of Jowar, Arhar, Moong, Urd, Pea, Gram, Lentil, Mustard, Linseed, Til and Soyabean is obtained in the field of selected holdings.
On an average, slow growth crops shared to 70.07 percent of the cost of cultivation, 70.00 percent of the gross output, 69.77 percent of net income, 69.33 percent of family labour income and 72.08 percent of the farm business income obtained on the farm as a whole. Costs and returns both were maximum on the holdings of 2-4 hect. size group. On an average, per hectare cost of cultivation, gross income, net income, FLI anf FBI on slow growth crop has been worked out to Rs. 5326.10, Rs. 7433.33, Rs. 2107.23, Rs. 2720.20 and Rs. 5051.59, respectively.

Among the cash input, slow growth crop, on an average, contributed to 46.09 percent of the costs of manure and fertilizer, 58.94 percent of irrigation, 64.44 percent of plant protection chemical, 72.99 percent hired labour costs, 67.86 percent of family labour cost to their total costs on the respective items on the farm as whole.

On an average, human labour cost contributed to 35.61 percent of the total variable cost on slow growth crops on the selected farms. The percent contribution of cost of seed, BLC, tractor operation, cost of fertilizer and cost of plant protection to the total variable cost on the studied holdings have been worked out to 20.84, 18.95, 12.65, 4.97, 3.70 and 0.88 percent, respectively.

The study on socio-economic constraints responsible for the poor adoption of modern technology in the cultivation of slow growth crops, shows that the adoption of modern technology was relatively more popular on the farms owned by forward caste in comparison to others. The positive relationship between education level and intensity of adoption of modern technology of agriculture was visible on the selected holdings as both
are increasing with an increasing in size of holdings. On an average, 56.67 percent farmer were having unexposure, 33.33 percent fairly exposed and only 10.00 percent were highly exposure to mass media of communication like Radio, Television and Newspapers etc. Exposure to the extension programme like demonstration, exhibition and meetings was very poor as 90.83 percent of the selected farmers responded lower exposure, 6.67 percent fair exposure and only 2.50 percent were found with high exposure to the above extension programme. The farmers of younger age group than older one were more inclined in the adoption of new technology. Sex did not showed any relationship with the adoption of modern technology of crop cultivation.

It has also been found that 66.67 percent of the farmers did not have any contact with the extension agencies like Block (Kshetra Samiti), office of the agricultural extension etc. Only 9.16 percent farmers were in the contact of these extension agencies.

Institutional membership analysis shows that 55 percent farmers were not the member of any of the financing institutions viz. cooperative credit society, cooperative land and rural development bank, regional rural bank, commercial bank and cooperative marketing society. 30 percent were the member of any one institution and only 14.17 percent farmers were the member of any two or more institutions in the sample.

The irrigation water unavailability was the major constraint in restricting the adoption of modern technology of agriculture in the cultivation of slow growth crops as, on an average, only. 12.45 percent of the cultivated area was under assured irrigation. It showed slight decreasing tendency with an increase in size of holding. However, the area
covered under HYV to the total area under slow growth crops, on an average, was 46.80 percent and showed increasing tendency with an increase in size of holding. But due to the poor level of other complementary crucial inputs like fertilizer, irrigation facility, plant protection chemicals, cultures and minor nutrients, the bridgeable gap in yield varies from a minimum of 44 percent to a maximum of 78 percent on the studied holdings.

In spite of the constraints described earlier, few hammering constraints came out during the interview of the farmers which crashed the entire infrastructure of the agricultural development and transfer of technology programme.