CHAPTER - V

DISCUSSIONS
Sunflower is an important oil seed crop and farmers have taken it up as main cash crop during zaid season. In U.P., its cultivation is confined to the areas with assured irrigation. Sunflower is mainly grown during spring season after harvest of rapeseed, pulses and potato. The scope for cultivation of sunflower in kharif is restricted due to rains and in rabi season due to competition with cereals and other more remunerative activities include conduct of demonstration field goshthies, minikit testing, competitions, crop days, radio or T.V. broadcasts, circulation of extension literature etc. The findings have been cross examined in the light of reported work objective wise in the present chapter.

I. TRENDS OF OVERTIME CHANGE IN AREA, PRODUCTION AND PRODUCTIVITY OF SUNFLOWER IN U.P. AND FACTORS ASSOCIATED WITH IT.

The findings revealed that cultivation of sunflower was restricted to 6 thousand hectares till more productive varieties of sunflower were introduced in 1988-89 and country experienced great shortage of edible oils. Overtime increase in area during the last 7 years (1985-92) was found to be dissimilar ranging from a minimum of 133 percent in Allahabad, 235 percent in Lucknow, 2087 percent in Kanpur and 5688 percent in Agra division in comparison to 876 percent in U.P. and 76 percent in India. The variability in area and differential rate of overtime increase establish that sunflower cultivation shall continue to be constrained by the agroclimatic conditions, cropping patterns, resource availability and consumer market demand. Allahabad and Lucknow divisions have large area under wheat and rapeseeds. The harvest of these crop gets delayed allowing very little scope for sunflower during spring season. The ground and surface water in Allahabad and Lucknow divisions during spring season falls short of demand to take up a
zaid crop. In Lucknow division a large area is under mixed cropping
during rabi season and, hence, no field under mixed cropping is
available for sunflower.

The analysis of production of sunflower reveals that it
rose from 0.75 to 16.07 thousand tons in Agra, Allahabad, Kanpur
and Lucknow divisions registering over all increase of over 2000
percent as compared to 1442 percent increase in U.P. and 87 percent
increase in the country during the period of 1985-92. Among 4
divisions, Agra registered an increase of 7075 percent as compared
to 2385 percent, 444 percent and 220 percent of increase in Kanpur,
Lucknow and Allahabad divisions respectively. This highlights that
area under sunflower crop was the major factor of large production
in Agra and Kanpur divisions. Area of sunflower in Allahabad and
Lucknow divisions with held the production of sunflower and shows
the urgency of efforts to be directed in such areas.

The analysis further examines the level of productivity of
sunflower and overtime change in order to assess the need of
extension efforts in increasing productivity. The findings
establish that the productivity increased from 9 quintals to about
12 quintals indicating an overall increase of 37 percent during the
last 7 years (1985-92) against 57.8 percent increase in U.P. and
6.8 percent in the country. The division wise analysis shows that
Lucknow division observed average yield of 7 to 9.4 quintals of
yield till 1989 but it suddenly increased to 11.92 quintals by year
1992. This clearly shows the impact of new highyielding varieties
and concerted extension efforts.

The comparison of yield performance of major 10 varieties
of sunflower as given in table no 1.5 indicates that farmers
obtained an average of 13.25 quintals of yield as compared to 14.62
quintals of yield obtained in field level demonstrations and 18.78
quintals of yield obtained at experimental fields. Thus, a differ-
ence of 10.34 per cent is seen between demonstration and farmers
yields and 41.74 percent difference between experimental and demon-
stration yield. It also highlights that the potential of varieties is being obtained by the farmers with slight variation in managerial ability.

**FACTORS LIMITING AREA AND PRODUCTIVITY OF SUNFLOWER**

The study has analysed the technological factors considered to be limiting the area and productivity of sunflower. The findings as contained in table No. 4.5 give opinion of farmers, extension personnel, scientists and field representatives. It is clear that acute damage from wild animals and birds, frequent irrigation, isolated sowing, marketability of produce and low extraction efficiency discourage farmers to increase area under sunflower. It is also observed that use of quality seeds of hybrids and composite varieties, planting during February to first week of March and continuous cultivation in existing cropping pattern are to be major bottlenecks in increasing production of sunflower. The productivity was found to be restricted largely due to deteriorated quality of seeds, late sowing, poor rouging & thinning and plant protection practices. Poor plant population, poor pollination and moisture stress or excess conditions are also found to be restricting the productivity of sunflower.

Patel (1977), Garg and Bhan (1978) have observed that sunflower cultivation can be extended in new command areas in traditional, as well as, nontraditional oil seed areas which can lead to an increase in contribution of sunflower for one eighth of oilseeds production in country to meet out the consumer demand sufficiently. Chaudhary, Mahajan and Paturde (1978) have reported on similar lines that sunflower has good prospects in the country if grown in kharif, winter and summer seasons. However several studies including those conducted by State Bank of India (1979) and Pizarro and Cattanco (1980) establish that oil seed area and production suffers with sharp fluctuations due to several reasons.
which need to be examined. Patel & Singh (1980) and Mohammad & Rama Rao (1984) reported the contribution of agronomical practices as potential factor for increasing productivity of sunflower. They observed that number of irrigations vary on soil type, atmospheric humidity and temperature besides the crop geometry and fertility status. Several experiments conducted on fertilizer intake and efficiency of germplasm as well as inter cropping sequences in sunflower are worth examination in order to increase productivity of sunflower. (Narsimha Rao & Ready (1982), Rangaswami, Purushotham, Sivaram, Appadurai, Peter & Raman (1983) and Nikam, Patil & Deokar (1984)).

II. KNOWLEDGE GAP ON SUNFLOWER CULTIVATION AND SOCIO ECONOMIC FACTORS ASSOCIATED WITH IT.

The study has examined knowledge of farmers and extension workers on seed, fertilizer plant protection, appropriateness of technology and use pattern of sources and channels of communication. The study has also worked out farmers preference for important varieties of sunflower.

It is observed that extension personnel possessed nearly correct knowledge status. The gap in knowledge status was somewhat prominently expressed on seed treatment, cost & returns in sunflower cultivation and crop adjustability in agroclimatic conditions. Comparatively the knowledge of higher level officers was greater than field level extension workers. The knowledge about fertilizer use practices was also found to be at appropriate level with lesser degree of variability in cadres of extension personnel. Similarly extension personnel possessed satisfactory knowledge about plant protection practices. However, the field level personnel exhibited a lower status of knowledge than their senior officers. Extension workers were also inquired about appropriateness of sunflower technology to the needs of the farmers. It is interesting to note that extension personnel observed almost all components of sunflower technology to be appropriate to the needs of the farmers. However, the critical factors' analysis revealed a difference of opinion
among themselves on control of diseases and pests, availability of pesticides and equipments, effectiveness of pesticides, soil testing, doses of fertilizer, sowing practices, seed treatment, seed rate, yield potential and suitability for an ecological area.

Similar findings are reported by Pandey (1975), Padheria (1973), Dubey and Singh (1977), Binswanger (1979), Jaiswal & Das (1980). While analysing rice farming technology they observed wide gap in assessment of appropriateness of technology between extension workers and farmers which reflected in low yields on farmers fields. Swaminathan (1979) held that knowledge gap is mainly responsible for lower yields of oil seeds, pulses and paddy where as Zodha (1976) highlights the need of close interaction among research scientists, extension workers and farmers. The knowledge gap on fertilizer use in major crops was highlighted by Binswanger and Jodha (1978). The gap of knowledge on plant protection technology was established by Somsunderum (1976) and Swindel (1979). Rosers (1976) has gone in detail on assessment of factors responsible for knowledge gap of extension personnel and farmers and observed that most innovations are not properly scrutinized by development workers and, therefore, the diffusion system fails to convince the farmers to adopt these innovations.
The study analyses 10 sources and 6 channels used by different categories of extension personnel for propagating sunflower technology. The findings reveal that progressive farmers, Village development officers & Kisan sahayaks are major sources of information, as well as, feed back of problems related with sunflower cultivation. The subject matter specialists, scientists and kisan sahayaks are also used by most of the extension personnel. Demonstrations, discussion and gosthies are found to be major channels of communication used by the scientists and kisan sahayaks. Thus, for purposes of feed back of sunflower the utilization of sources/ channels by the extension personnel is limited and more efforts are needed for use of available sources and channels. The efficiency of a farmer also affected by the level of knowledge apart from his behavior about a technology. The findings have shown a satisfactory level of knowledge of farmers about most of the practices of sunflower cultivation. The knowledge of farmers was also found to be positively related to size of holding. Practice-wise analysis shows a higher degree of knowledge of farmers about time, method, number of irrigation, time & method of sowing, seed rate, varieties, pest control and thinning. However, the knowledge was poor about plant protection, fertilizer use and harvesting. Very little literature is available on farmers knowledge about sunflower.
The farmers have exhibited difference in preference for characters of sunflower varieties among 12 major characters of prominent 7 varieties. The farmers preferred market price, early maturity, vegetative growth, seed availability, requirement of irrigation, low cost of production and seed size & colour. These factors accounted to be more relevant for Jwalamukhi, M.S.F.H. 8 and Divyamukhi varieties. Multiple cropping and intercropping compatibility, seed size and colour, medium maturity and cost of production did not affect much in selection of varieties. It is also interesting to note that the high yielding character of a variety was not considered to be fundamental. The above findings confirm that farmers make a decision after considering several factors related to an enterprise. Only high returns and low investment will not matter. Singh and Singh (1985), Chaudhary and Anand (1985), Jaya Kumar, Prem Shekhar, Kempucletty & Subramanian (1988), Rao, Uma Devi and Rao (1991) confirm that proper and timely accessibility of farmers to the knowledge and resources could help to increase sunflower production and encourage area and productivity.

ADOPTION OF PRACTICES AND DETERMINING FACTORS

The study has analysed age, caste, Education, Socio-Economic Status, Occupation, land holding, annual income, sources of irrigation, possession of implements, extension contacts and scientific & risk orientation and their association with adoption & productivity levels. The findings reveal that age, education, socio-economic status, land holding, annual income and extension contacts are positively related to adoption and productivity levels. On the contrary, caste and occupation do not seem to be associated with adoption or productivity.

Sunflower being a new enterprise, most of old age farmers are not aware of agronomy of the crop. Only young farmers who are
close to extension system and those who go around the demonstration are attracted and come out to grow sunflower. Therefore, the farmers of 21-60 years of age group were found to form majority and ranked high in adoption and productivity.

Education and socio-economic status also indicated to go in association with adoption and help increase productivity. Education determines mental attitude and socio-economic status helps to attain physical and behavioral ability to reach to an enterprise and achieve benefits. Thus education and socio-economic status both contributed to perform better in cultivation of sunflower and harvest desirable yield.


Land holding determines the opportunities of crop and thereby resource status. Better resource status and opportunities of cropping-husbandry create a favourable condition for adoption of package of practices and management which lead to obtain higher productivity. The findings confirm this hypothesis as also observed by Singh (1977), Adhikari & Sen (1978) and Rama Murthi & Bhaskaran (1974).

Similarly, annual income is a major determinant of social status and resource investment ability. Share of agricultural to total income and per family income indicates per hectare cash input
Scientific and risk orientation are behavioral characteristics which are believed to function as a psychological process. The farmers who are innovative and possess scientific temper come forward for a new enterprise just to satisfy their urge of doing something new. The scientific orientation varies from person to person and from technology to technology. The socio economic and behavioral conditions have improved scientific orientation but mostly the extension contacts and past experience helps a farmer to a great extent. The present finding reports that farmers in general have high level of scientific orientation. This might be due to the fact that all sample farmers were cultivating sunflower was a new enterprise. The opinion of farmers about commercial aspects of sunflower cultivation like thinning, protection from birds, timely sowing, nutritional management, crop geometry and economics of cultivation were found to be highly positive. However, the scientific orientation was found to be in association with socio economic status as observed by Hopper and stageland (1958), Bose (1962), Singh (1974) and Ram (1975).

Risk orientation is also a potential variable deciding farmers mental ability to adopt a new practice being fully aware of losses and uncertainties. Sunflower cultivation being a new enterprise most of the farmers defer its adoption in absence of experience and risk bearing ability. The economic status of general farmer restricts him not to initiate sunflower cultivating in acute ignorance. Sunflower cultivation demands high cash investment on seed, fertilizer, irrigation, plant protection, post harvest and watching. The farmers with higher annual income have opportunity of marketing and making higher investment, where as, others with low income are deprived of this opportunity. Land holding also seems to be associated with family income and cash
Extension contacts lead to gain in knowledge and thereby contributes towards adoption and productivity. It is observed that a positive relation exists between size of holding and contacts with the extension personnel. The size of holding is found to be positively associated with extension contact and thereby with adoption and productivity levels. The analysis further shows that landless marginal and small farmers are comparatively more close to lower cadre of extension agency, whereas, medium and large households have greater accessibility with lower, as well as, upper cadre of extension agency.

This finding is based on a survey of demonstrating farmers and extension agencies associated with sunflower programme. The experiences are not only true for sunflower only but it is a general observation. The impact of extension contacts has emerged in the present study in confirmation with the earlier observations as reported by Murthi & Singh (1974), Adhikari & Sen (1978), Temple (1959), Tiwari (1964) Heaven (1962), and Chitamber (1961). The respondents who have taken up sunflower cultivation have firstly experienced the results on neighbour farmers and collected facts about sunflower cultivation and then only with little input of risk orientation started sunflower cultivation. Still they share their experiences among themselves to safeguard against the low profits or economic losses in stead of talking about more profits and production. Rayan & Binswenger (1979) and Hatchinson (1979) have also observed that scientific and risk orientation variables play effective role in adoption of new enterprise whereas Bose (1962), Singh (1974) and Patel (1977) observed that risk orientation helps in adoption of each and every practice of an enterprise independently, where as scientific orientation functions in initial stages only.

The study has analysed technological factors responsible
for area and productivity of sunflower in order to assess the prospects for substantial increase in future. For this purpose, the cropping patterns, area under sunflower, crop sequences and area under crops have been studied.

THE AREA UNDER CROP SUBSTITUTION FOR SUNFLOWER

The findings have pointed out that in the sample area intensity of cropping ranged from a lowest of 206 to a highest of 291 in case of large and landless categories of households respectively. It shows that the intensity of cropping decreases with the increase in size of holding. The analysis further shows that kharif, rabi and zaid seasons register a share of 44.13, 42.22 and 13.64 percent respectively indicating scope of about 86 percent of area diversion to sunflower crop in zaid season. comparatively small medium and large house holds have potential of large areas.

It is further evident from the findings that all the farmers growing sunflower planted the crop in zaid season only. As much as 73 percent of the cultivated area in zaid season was put under sunflower. The area under sunflower was also found to be positively related to size of holding as evident from the figures of 0.33 ha of average area with landless category and a minimum of 0.83 ha of area under sunflower with large house holds.

Sunflower is cultivated in different crop rotations. As much as 10 major crop rotations were found to be practiced in Agra, Allahabad, Kanpur and Lucknow divisions. These crop rotations differ from area to area. As revealed from the findings that early paddy-rice-sunflower is popular in Agra and Kanpur, Maize/paddy-wheat-sunflower in Agra, Kanpur and Lucknow and Maize-Potato-Sunflower in Kanpur.

It is further observed that paddy, maize, jwar and bajra are major crops grown by all categories of farmers during kharif season. Wheat, potato, rai, pea and mustard are grown in rabi and sunflower, mung and vegetables during zaid. Categorywise the medium and large farmers have potential for diverting area under pea, rai and second ratoon of sugarcane for sunflower cultivation during
Similarly inter cropping of sunflower with moong, urd, sugar-cane and vegetables can increase sufficient area under sunflower specially among landless, marginal and small holdings.

The fallow area to the extent of 26 percent can also be diverted to sunflower crop in zaid season.

TECHNOLOGICAL CONSTRAINTS

A perusal of limitations to the expansion of sunflower crop has been examined in the present study. Among major limitations the damage from wild animals and birds, lack of irrigation, isolated sowing and marketability of the produce were prominently highlighted. The poor quality of hybrid and composite variety of seeds, late harvest of rabi crop and pressure of threshing and sale of rabi crops cause delay in planting of sunflower. Sunflower being highly fertilizer responsive crop, farmers are at many times unable to invest on fertilizers. The intensity of these limitations were similarly perceived by the scientists, as well as, extension workers. However, a clear distinction of opinion was found to prevail on seed germination, quality of seed, artificial pollination, and incidence of insect pests, problems of sterility, seed setting in flower, seed mixtures and branching are also confirmed unanimously by the farmers and field extension workers.

The present features of varieties of sunflower were analysed by interrogating the farmers about seed characteristics. The analysis shows that availability of seeds maturity period, susceptibility to diseases and pests, oil percentage, yield potential and non branching character, as well as, uniform head formation are the major determining characteristics. Patel and Patel (1988), Singh (1990), Govil (1991), Arvind (1979), Warsi Pathak and Govil (1991) and Padheria (1973), have analysed several constraints to production of sunflower and expansion in area and adoption of recommended package of practices. Govil (1991) has outlined similar factors for rejection of sunflower varieties. These observations are in confirmation of present findings.
The influence of extension activities in respect of increasing the sunflower programme can not be underestimated. The extension activities include conduct of demonstrations, field gos-thies, minikit testing, competitions, crop days, radio or T.V. broadcasts, circulation of extension literature etc. It is observed that most of the activities are target and area oriented. These activities cast definite impact on the minds of the people and act as a catalyst of attitudinal change. The present study has analysed the categorywise participation of the beneficiaries in different extension activities. The findings reveal that block demonstration, radio/T.V programme and literature were largely attended whereas training, excursions, film shows, exhibition and crop days could reach to only a fragment of respondents. No proper record of field activities organised and returns to investment on such activities was kept. Nor the impact of such activities was assessed.

The categorywise analysis also reveals that medium and large house holds had better accessibility to these extension activities specially the demonstration and trainings in comparison to small and marginal house holds. Similarly the impact of minikit trails was also not properly monitored and this is why the impact of large investments made on conduct of minikit trails could not be properly assessed.

The study further analysed opinion of respondents about the type of contributions of extension activities. It is revealed from the study that the extension activities influenced as much as 63 percent of the respondents to increase productivity. Fifty-one percent of the farmers were helped to increase the area under sunflower, 48 percent of them were helped in input arrangement. As much as 41 and 44 percent of respondents could be assisted in crop protection and removal of constraints to productivity. About 35 percent of the respondents started sunflower cultivation as an impact of extension activities. The analysis shows that the behavioral impact of the extension activities on sunflower was almost
uniform among all categories of respondents.

The findings about extension activities pointed out that the extension activities are far below the requirement of farmers in view of covering a large farming community cultivating sunflower in deavours conditions of soil, climate and cropping systems. The extension activities also need to be organised differently considering the different needs of the farmers. More emphasis needs to be given to expansion of area under sunflower. Considering the lack of scientific knowledge among extension workers and farmers, extensive training programmes should be organised. These findings are in conformity to the findings reported by Dubey and Singh (1977), Hutchinson (1979), Murthi and Singh (1974), Adhikari and Sen (1978) Choubey (1970).

The study has examined the economic support being given to the farmers for sunflower cultivation. The economic support activities included the availability of improved hybrid seeds through private companies and government stores and subsidy provision on seed, fertilizer and other production inputs, marketing structure and government purchase etc. It is accepted that conducive policies of the government create favourable atmosphere for encouraging farmers to extend area under the crop.

The findings reveal that farmers moderately appreciate the government policies regarding sunflower cultivation. The opinion of different categories of farmers was found to be almost similar in respect of subsidy to be on "insufficient", "urgency of its increase", "difficult availability of plant protection, chemical and equipments", "low support price", "low market demand" and "need of increasing native consumer demand of sunflower oil by stopping imports". The current policies were rated less agreeable and farmers observed quite good scope for improvement in Govt. policies. The farmers widely criticised the government policies which discriminate on account of land holding or on caste basis as the sunflower cultivation is large scale enterprise (Popularly said to
be a community crop). They suggested that subsidy on various production inputs should be made more informal and uniform. They suggested for a consolidated single window approach for arrangement of all production inputs. They observed that for crop expansion timely seeds supply, monitoring during critical period of crop growth, protection against diseases and pests, functioning of state tube-wells and canals and marketing are the most crucial aspects.

A critical analysis of various subsidy component has been made by seeking the opinion of respondents of different categories. The finding pointed out that sunflower being a new crop the government is providing financial support to the farmers on block demonstrations (with a subsidy of Rs 800 per ha or 50 percent of the total cost of production). Subsidy on seed of hybrid varieties was at 50 percent and on composite varieties at the rate of Rs. 10 per Kg. Subsidy on purchase of agricultural implements was 50 percent (to a maximum limit of Rs 500). The plant protection chemicals and equipments were given subsidy of 50 percent (to a maximum limit of Rs. 100 & 500 respectively). Besides the farmers were given soil testing and minikits of 1.5 Kg. costing Rs. 30 free of charge.

The findings revealed that the respondents to the maximum extent of 30 and 35 percent availed subsidy provision on implements and seed and 11 to 20 percent of the respondents availed subsidy on fertilizer, plant protection equipment and chemicals and soil testing. None of the respondents availed minikits of sunflower. The categorywise analysis shows that medium and large farmers comparatively derived more benefits.

These findings highlight the need of increasing the amount of subsidy on each component and extending the benefits of subsidy to all categories of growers easily and on uniform pattern.