CHAPTER VI

SUMMARY AND CONCLUSION
Oilseed crops cover about 9 per cent of the total agricultural income of the country and 9.6 per cent of the total cropped area. During the last 25 years the demand of edible oil has increased to the extent that the country was found to import large quantity of oil. Sunflower is a potential oilseed crop which can be grown throughout the year in all geographical and climatic conditions of the country. Being a new crop the area and productivity of sunflower has been restricted to 40 thousand hectares only in U.P. The crop faces strong competition with cereals like paddy, maize, wheat, potato, rapessed and pulses in kharif and rabi seasons. Thus the area is confined only in zaid season after the harvest of potato and early rabi crops. Its wide adaptability in multiple cropping/companion cropping gives hope of increased area under sunflower. The present study is designed to analyse the factors governing area and productivity of the crop in order to develop strategy for removing the impediments in increasing area and productivity of the crop.

Specifically, the study is focussed on analysis of the trends of change in area and productivity in U.P. ascertaining the knowledge of extension workers and farmers about package of practices and their socio economic status as associated with it. The study delineates factors affecting adoption/crops and analyses technological factors contributing/limiting towards area and productivity of the crop. It examines the impact of extension education activities, economic support and marketing structure in order to push the crop. Lastly, the study suggests extension strategy for promotion of the crop in Uttar Pradesh.

The study has been conducted in Agra, Allahabad, Kanpur and Lucknow divisions consisting of sample of 8 Districts (Two from each Division) viz Allahabad, Fatehpur, Mainpuri Etah, Kanpur Dehat, Farukhabad, Unnao and Hardoi, 8 Sub divisions (One from each
The selection of the area was made on the basis of concentration of maximum area under the crop. The study includes a sample of 200 sunflower growers (5 from each kisan sahayak circle) and 61 extension workers, 5 representatives (non official) and 10 scientists. In all 29 variable were studied including socio psychological, 2 communication, 10 economic, 4 resource gaps and 4 technological gaps were analysed.

The study examined the data using descriptive case study research design with the help of mean score, percentage, mean co-relation coefficient and critical ratio.

The findings are summarized as here under:

Sunflower is an important oil seed crop and farmers have taken it as the main cash crop during zaid season. In U.P., its cultivation is confined to the areas with assured irrigation. 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 crops. The findings revealed that cultivation of sunflower was restricted to 6.04 thousand hectares till more productive varieties of sunflower were introduced in 1988-89. Overtime increase in area during the last 7 years (1985-92) was found to be dissimilar. Figures of overtime increase establishes that sunflower cultivation shall continue to be constrained by the agroclimatic conditions, cropping patterns resource availability and consumer market demand. In sowing of kharif crop gets delayed then sowing & harvesting of rabi also get delayed. This allows very little scope for sunflower crop during spring season. The ground and surface water during spring season falls short of demand to take up a zaid crop with great water requirement. The analysis of production of sunflower reveals that it rose from 0.75 to 16.07 thousand hectares and in
Agra, Allahabad, Kanpur and Lucknow divisions registering an overall increase of over 2000 percent as compared to 1442 per cent increase in U.P. and 87 per cent increase in the country during the period of 1985-92. Findings establish that the productivity increased from 9 quintals to about 12 quintals indicating an overall increase of 37 per cent during the last 7 years (1985-92) against 57.8 per cent increase in U.P. and 6.8 per cent in the country. Farmers obtained on average 13.25 quintals of yield as compared to 14.62 quintals of yield obtained on field level demonstrations and 18.78 quintals of yield obtained on experimental fields. It is clear that acute damage from animals and birds frequent irrigation, isolated farming, marketability of the product and low extraction efficiency discourage farmers to increase area under sunflower. Use of quality seeds of hybrids and composite varieties, planting during February to the first week of March and continuous cultivation in existing cropping patterns are 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 moisture conditions are found to be restricting the productivity of sunflower.

The gap in knowledge status was somewhat prominently expressed on seed treatment, cost and returns in sunflower cultivation and crop adjustability in agroclimatic conditions. The knowledge about fertilizer use practices was also found to be inappropriate. Field level personnel exhibited a lower status of knowledge than their senior officers. It is interesting to note that extension personnel observed almost all components of sunflower technology to be appropriate for 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 pesti-
cides, soil testing, doses of fertilizer, sowing practices, seed treatment, seed rate yield potential and suitability of an ecological area. The findings reveal that progressive farmers, village development officers and kisan sahayaks are major sources of information, as well as, feedback of problems related to sunflower cultivation. For purposes of feedback of sunflower the utilization of sources/channels by the extension personnel are limited and more efforts are required. The findings have shown a satisfactory level of knowledge of farmers about most of the practices of sunflower cultivation. Practice wise analysis shows higher degree of knowledge of farmers about time, method, number of irrigation, time and method of sowing, seed rate, varieties, pest control and thinning. However, the knowledge was poor about plant protection, fertilizer use and harvesting. The farmers preferred market price, early maturity, vegetative growth, seed availability, requirement of irrigation, low cost of production, seed size and colour. These factors accounted to be more relevant for Jwalamukhi, M.S.F.H.B and Divyamukhi varieties. Multiple and inter cropping compatibility, seed size and colour, medium maturity and cost of production did not affect much in selection of varieties. The study has analysed age, caste, education, socio-economic status, occupation, landholding, annual income sources of irrigation, possession of implements, extension contacts and scientific & risk orientation and their association with adoption and 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. Caste and occupation do not seem to be associated with adoption and productivity. Sunflower being new enterprise, most of the very aged farmers are not aware of the agronomy of the crop, only young farmers, who are close to extension system and those who go around the demonstrations are attracted and come out to grow sunflower. Education determined mental attitude and socio-economic status help to attain physi-
Lair and behavioral ability to reach to such an enterprise and achieve benefits. Thus, education and socio economic status both contribute to perform better in cultivation of sunflower and harvest desirable yields. Land holding determines the opportunities of crop and farming system. Similarly, annual income is a major determinant of social status and resource investment ability. The high investment capability is positively associated with productivity status. 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. Findings report that farmers in general have high level of scientific orientation. 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 highly positive. Risk orientation is also a potential variable deciding farmer's mental ability to adopt a new practice being fully aware of losses and uncertainties. Sunflower cultivation being a new enterprise most of the farmers hesitate in its adoption in absence of experience and risk bearing ability. Most of the farmers are small households with poor resource structure and insufficient knowledge. The economic status of a general farmer also restricts him not to initiate sunflower cultivation as it demands high cash investment on seed, fertilizer, irrigation, plant protection, post harvest operations and marketing. Extension contacts lead to gain in knowledge and thereby contribute in adoption and productivity. It is observed that a positive relation exists between the size of holding and contacts with the extension personnel. 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. The respondents who have taken up sunflower cultivation have
firstly experienced the results on neighbor farmers and collected facts about sunflower cultivation and then started sunflower cultivation with little input of risk orientation. The study has analysed technological factors responsible for area and productivity of sunflower in order to assess the prospects for substantial increase in sunflower in future. The findings have pointed out that intensity of cropping ranged from a lowest of 206 to a highest of 291 in case of large and landless categories of household respectively. Sunflower is cultivated in different crop rotations. As much as 10 major crop rotations were found to be practiced in the Agra, Allahabad, Kanpur and Lucknow divisions. It is further observed that paddy, Maize, Jwar and Bajra are major crops grown by all categories of farmers during kharif season. Category wise, the medium and large farmers have potential for diverting area under pea, rai and second ratoon of sugarcane for sunflower cultivation during rabi. Inter cropping of sunflower with mung, urd, sugarcane and vegetable can increase sufficient area under sunflower, specially among landless, marginal and small households. The fallow area to the extent of 26 per cent can also be diverted to sunflower crop in zaid season. Limitations in extension of sunflower crop examined in the present study revealed that damage from wild animals and birds, lack of irrigation, isolated sowing and marketability of the produce and poor quality of hybrid and composite varieties of seeds are major ones. Sunflower being a highly fertilizer responsive crop, farmers are unable to properly 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 insects and pests. The analysis shows that availability of seeds, maturity periods, susceptibility to diseases and pests, oil percentage, yield potential and non branching character, as well as, uniform head formation are the major determining characteristics. The
Extension activities include conduct of demonstration fields, goathies, minikit testing, crop competitions, field days, radio and T.V. broadcasts, circulation of extension literature, etc. The findings reveal that block demonstration, radio/T.V. programmes and literature were largely attended, whereas trainings, excursions, film shows, exhibitions and crop days could reach only a fragment of respondents. Impact of minikit trials was also not properly monitored and this is why the impact of large investment made on conduct of minikit trials is not properly assessed.

The findings about extension activities point out to the fact that the extension activities are far below the requirement of farmers in view of covering a large farming community cultivating sunflower indiverse 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 need to be given on expansion of area under sunflower. Considering the lack of scientific knowledge among extension workers and farmers, extensive training programmes should be organised. It is accepted that conducive policies of the government create favourable atmosphere for encouraging farmers to expand area under a crop. The current policies were rated less agreeable perceiving quite a good scope for improvement. Subsidy on various production units should be made more informal and uniform. They also considered single window approach to be helpful to farmers for consolidated arrangement of all production inputs for sunflower. They observed that monitoring of the seed supply, crop growth, crop protection against diseases and pests, state tubewell and canal and marketing are the most crucial aspects. These findings highlight the need of increasing the amount of subsidy on each component and extending the subsidies to all categories of growers.

Continuous cropping of sunflower year after year in the same fields not only brings down per hectare yield but also aggravates problems of insects and diseases and depletes the soil
lously planned 2 or 3 year crop rotation to minimise insect pest and disease problems and sustain the productivity levels. As excessive and continuous wet weather during the flowering period leads to poor seed setting hence sowing needs to be so adjusted that clean and rain free period is available during reproductive period. In soils which are ill drained planting of crop other than suggested time schedule may often lead to either moisture stress at critical crop growth stages or poor drainage. Birds also pose serious problem if taken up in small and isolated pockets, hence, cultivation of sunflower is recommended in large contiguous blocks. In case growing conditions are good and farmers can apply the recommended input levels, preference be given to hybrids in place of straight populations for higher returns and yields. Use of certified and treated seed maintenance of optimum plant stand and spacing between rows and plants within the row need to be popularised. The first 45 days of crop period is very sensitive to weed competition, therefore, sunflower growers should be advised for weed control. Farmers be advised to start bee keeping in sunflower field. Insect control during the blooming period be discouraged as it prevents the visit of bees.
The present research project on sunflower has analysed the current trend of change in area, production and productivity, the factors affecting these trends (including behavioral, economic and technological) in order to formulate a suitable extension strategy for the crop. The study is based on survey of 8 districts (prominently growing sunflower from central and western U.P.) through personal interview with sample of 200 farmers, 66 extension workers and 10 scientists.

The findings revealed that cultivation of sunflower is restricted only to zaid season with assured irrigated areas. No significant discrimination on socio-personal factors is observed excepting some influence of age, education, size of holding, resource endowment and communication accessibility, scientific and risk orientation. These factors operate more with lower category of households. The knowledge of extension personnel and farmers growing sunflower were not significantly different categories. The aspects like varieties, plant geometry fertilization, maturity and plant protection were seen to be deficient aspects among all categories of households.

The technological and economic constraints governing area and productivity of the crop were studied and findings revealed that low quality seed, seed variability, segregation in seed, late vacation of rabi fields, erratic water supply and incidence of insect pests greatly discourage the extension of area under sunflower as well as its productivity. The economic support through subsidies help farmers considerably but mostly to medium and large households and those having good accessibility to extension functionaries. A large number of lower category of farmers community still feels deprived of extension and economic support chiefly marketing of the produce.
Conclusively, the sunflower cultivation still needs a more strong economic and comprehensive extension support to encourage the area and productivity of the crop in U.P. The efforts need to be concentrated to the prospective areas and farming community. The components of the seed supply, subsidies on plant protection and marketing need to be carefully monitored.