CHAPTER VI

SUMMARY, CONCLUSIONS AND SUGGESTIONS
CHAPTER VII

SUMMARY

The present investigation on "Evaluation of suitable herbicides for weed management in rabi cereal, pulses and oilseeds" was conducted during 1990-91 and 1991-92. The crops included in the experiment comprised of wheat, gram, lentil, linseed and mustard. The weed control treatments were weedy control, hand weeding (30 DAS), isoproturon @ 1.00 kg a.i./ha pre emergence, fluchlortalim @ 1.00 kg a.i./ha pre plant soil incorporated, butachlor @ 2.5 kg a.i./ha pre emergence. These were common for all the crops however, one more treatment 2,4-D @ 0.5 kg a.i./ha 30 DAS was also included in wheat. These treatments were replicated four times in randomised block design for each crop. The herbicides were applied in 600 liters of water by foot sprayers using flat fan nozzle.

The sowing of wheat was done @ 100 kg seed /ha in 30 cm row distance with NPK @ 60, 40, 20 kg/ha. The gram crop was sown at the seed rate of 75 kg/ha in 30 cm apart rows with 20:60:20 kg NPK/ha whereas the seed rate in case of lentil was 30 kg/ha. The sowing of linseed was done @ seed rate of 30 kg seed /ha with a 60:40:20 kg NPK/ha while the seed rate of mustard was used @ 5 kg/ha the apart from the same row distance and fertilizers were applied as per recommended practices.
The data were recorded on weed population species wise by list count quadrat method at 60-day stage and weed biomass was recorded before harvest of the crop in each treatment and crop. The data on crop plant population partitioning of dry matter accumulation at 30, 60, and 90 days stages. number of branches/tillers per plant, plant height and yield attributing parameters were recorded at harvest. The crop biomass and seed yield in each crop as per treatments were recorded. The computations of weed control efficiency, weed index and harvest index were done to assess the efficacy of herbicide in different crops.

The experimental field was infested with 23 species of 22 genera 12 families. The major weed species in all the crops comprise of Chenopodium album L., Convolvulus arvensis L., Launaea nudicaulis Hook. f., Vicia sativa L., Anagallis arvensis L., Trifolium flagiferum L., Lathyrus aphaca L., Amaranthus viridis L. among broad leaved species. The major grassy weeds were Cynodon dactylon L. Pers., Saccharum spontaneum L., Avena fatua L. and Phalaris minor Retz. while the sedges weed was Cyperus rotundus L..

The population of other weeds at the lower density was also noted for example Caesulia axillaris Roxb., Sphaeranthus indicus L., Rumex dentatus L., Euphorbia geniculata Orteg., Euphorbia hirta L., Melilotus alba L. Melilotus indica L. and Argemone mexicana L.. These weed species were common in all the crops.
Amongst the different weed control treatments, isoproturon was found most effective for reducing the total weed population. The weed control efficiency of this herbicide was maximum under all the crops. The weed control efficiency of 2,4-D in wheat was 74% and 84%, while the hand weeding was most effective with the weed control efficiency ranging from 85.43 to 92.80%.

The perennial weed namely *Cynodon dactylon*, *Saccharum spontaneum* L., *Cyperus rotundus* L., and annual broad leave *Convolvulus arvensis* L., *Vicia sativa* L., *Lathyrus aphaca* were not controlled by any herbicidal treatments in all the crops except 2,4-D, which managed *Cyperus rotundus* L., *Convolvulus arvensis* L., *Lathyrus aphaca*, and *Vicia sativa* in wheat. Influence of the herbicidal treatment on crops did not revealed any adverse effect as phytotoxic symptoms on all the crops except fluchloralin which cause the yellowing of the young seedlings in wheat only. Rest of the herbicides were selective to all the crops as evidenced by plant population recorded per meter row length plant height number of branches/tillers recorded per plant, dry matter accumulation in different plant parts and yield attributing parameters. The significant increase in all these yield attributing parameters was noted under all the herbicidal treatments as compared to weedy check in all the crops. The maximum increase was noted in isoproturon treatment followed by fluchloralin.
In wheat the effective weed control and higher yield was noted under isoproturon (2409, 2407) followed by 2,4-D, fluchloralin and butachlor. The hand weeding resulted the highest yield of wheat (2794, 2616). The weed index in wheat was 55% resulting the yield of 1281, 1157 kg/ha under weedy control.

In gram the effective weed control was noted under isoproturon with a weed control efficiency of (59.6 and 61.4%) followed by fluchloralin (43%, 42.4%) and butachlor (34.7%, 35.7%) where the hand weeding exhibited 90 and 91.8% weed control efficiency. The seed yield was highest under hand weeding (1988, 1662 kg/ha) followed by isoproturon 1820-1551 kg/ha, fluchloralin 1618, 1407 kg/ha and butachlor 1467, 1298 kg/ha. The control plot yielded 1244 and 1121 kg/ha during first and second year respectively. The weed index was 37.4 and 32.6% under weedy check.

In lentil, the effective weed control was noted with isoproturon having the weed control efficiency of 48.4 and 49% followed by fluchloralin and butachlor. The maximum weed control efficiency was under hand weeding. The seed yield among the different herbicides was maximum in isoproturon (1530, 1496 kg/ha) and butachlor (1308, 1245 kg/ha). Hand weeding gave significantly higher yield than all other the treatments. The yield of control was 1186 and 1102 kg/ha, with a weed index of 29.5 and 33%.
In mustard, the highest weed control efficiency was noted under hand weeding 76.5 and 80.3%, fluchloralin (66.9 and 60.5%) and butachlor 51.8 and 44.5%. The seed yield was the highest under isoproturon treatment (1605 and 1525) followed by hand weeding (1450, 1421) fluchloralin (1490, 1495) and butachlor (1387, 1290). The lowest yield was under weedy control (1196, 1136) with the weed index of 17.5 and 20% in first and second year respectively.

In linseed, the reduction of the weeds was the highest under isoproturon treatment with the weed control efficiency of 56 and 53% during first and second year respectively followed by hand weeding (49.5 and 48.5), fluchloralin (42.9, 41.8) and butachlor (31.7 and 27.8). The seed yield was the highest under isoproturon (1321, 1257) followed by hand weeding (1225, 1164) and fluchloralin (1216, 1119). The seed yield under weedy check was 9.07 and 8.10 kg/ha with a weed index of 25.9 and 30.4%.

On the basis of regression models, the reduction in yields by 5.6223, 4.8937, 4.4788, 3.468 and 2.812 kg/ha could be predicted in linseed wheat, gram, mustard and lentil, respectively with increase of one gram weed biomass m⁻² land.

As regard the economics of different herbicidal treatments, isoproturon was found most economical giving the net profit of Rs.7361 and Rs.6859/ha followed by hand weeding (7073, 6137/ha), fluchloralin (5838, 5094/ha) and butachlor (5435,
4591/ha). The control plot gave the net profit of 3118 and 3121 during first and second year, respectively on the basis of mean of all the crops.

Mustard was most economical which gave the net profit of Rs. 7043/ha followed by gram (Rs. 6597/ha) lentil (Rs. 5502/ha) linseed (Rs. 4508/ha) and wheat (Rs. 4114/ha).

CONCLUSIONS

The present investigation concluded that Chenopodium album L., Convolvulus arvensis L., Vicia sativa L., Anagallis arvensis L., Trifolium flagiferum L., Lathyrus aphaca L. are the major broad leaves weeds which infested the Rabi crops. While the grassy weeds viz., Cynodon dactylon L. Pers., Saccharum spontaneum L., Avena fatua L., Phalaris minor Retz. were of common occurrence and Cyperus rotundus L., was only the sedges weed was found in rabi crops.

Isoproturon @ 1.0 kg a.i./ha as pre-emergence was found suitable to control most of the weeds in all the crops. Other herbicides namely fluchloralin and butachlor were also selective to control the weeds in pulses and oilseed crops while 2,4-D was effective to control broad leaved, weeds in wheat. The perennial weed species and Convolvulus arvensis L., Vicia sativa L., and Lathyrus aphaca L. were resistant to all these herbicides except 2,4-D.
Isoproturon was most economical for managing maximum weeds in all the rabi crops. Among the crops mustard was most economical followed by gram, lentil, linseed and wheat.

SUGGESTIONS FOR FUTURE WORK

On the basis of present studies it is suggested that further experiments with more herbicides may be conducted to control the resistant weed species viz. **Convolvulus arvensis** L., **Lathyrus aphaca**, **Vicia sativa** L., **Cynodon dactylon**, **Saccharam spontaneum** L. and **Cyperus rotundus** L.

The residual effect of herbicidal weed control on succeeding **kharif** crop may be studied.