Discussion
CHAPTER V

DISCUSSION

The findings of the experiments regarding "studies on the morpho-anatomy, crop losses and pathogenic significance of important Rabi and Kharif crop of Tarai best of Uttar Pardesh", reported in the preceding chapter are being discussed, elicited and interpreted according to the accepted principles under different heads.

Weed are the unwanted plants in the crop fields with negative role in agricultural sense. Weeds commonly affects the moisture, nutrients or light contents which are required by the crop for better yield. They also provide cover or act as hosts for pests and diseases. Weeds also contaminate the crop produces, reduce the quality of crop, and in the extreme case poison the consumers. Evidences are there that some weeds exude toxins with adverse affects on crop growth. By and large weeds are most injurious to the life of a crop.
In this way, weeds constitute a major constraint in the crop production causing considerable loss and physical strain to the farmer (Achariya and Mudaliyar, 1921).

Among various types of damages due to weeds, and yield loss by weed competition in cultivated field in the most widespread and serious problem in food economics of India.

Various aspects related to weed biology including their morphology, anatomy, pathological aspects and their control in the present investigation were worked out.

Weed are most often defined as plants growing where man does not want them, and in the context of agriculture it has generally come to mean any plant other than the crop. Weeds offer a major challenge for the farmers to enhance productivity and for the government to meet food demands of their own nations (rather than supporting other having
unfavourable environment for agriculture (Sister et al., 2004).

Uninterrupted supply of nutrients light and moisture during growth period is pivotal to realize full yield potential of a crop. Weeds, being a serious negative factor in crop production for marked losses in crop yield, they may also provide cover or act as hosts for pests and diseases. Weeds may also contaminate the produce, reducing the crop quality, and in extreme cases produces poison. There are also indications that some weeds may exceeds toxins which adversely affect crop growth. The dwarf varieties of wheat are highly responsive to more number of irrigations and higher amount of fertilization which provide congenial condition for luxuriant growth of weeds (Mahajan and Brar, 2001).

Weed compete with crop plants for nutrients, soil moisture, sunlight and space and the intensity depends upon the nature of weed, severity of infestation, duration of infestation, competing ability
of crop plants and climatic conditions. The removal of plants nutrients more efficiently by weeds than crop is unestablished fact. Weeds also curtail sunlight and adversely affect the photo synthesis and plant productivity (Nagarajan, 2002).

During investigation, several weed forms of dicot and monocot families were found in the crop fields of wheat and rice during investigation. The density population and density of the forms varied in different years which may be because of change or alteration in the climatic conditions and experimental field with different cropping history and weed flora.

A progressive increase in the weed population, individual or total, till 75 DAS of crop growth, was obvious which may be attributed to nonsynchronous behaviour of weed seed germination contrary to crop germination and wide periodicity under field condition. Population and density increase associated closely with the increase in dry matter production of weed.
A density decline after 75 days of growth may be as some of the weeds emerged in the beginning completed their life cycle and also the suppression of small late emerging weeds by tall and luxuriant weeds and crop plants leading to their death (Benvenuti et al., 2003).

Wheat crops are infested with a number of weeds. It comprised of 14 weed species including 5 of monocots and 9 of dicots families (Gill and Brar, 1975; Chaubey and Singh 1984; Jain et.al., 1990). The morphological nature of weeds differed considerably and there were 4 grassy weeds (Avena fatua, Phalaris minor, Cynodon dactylon and Asphodelus tensuifolius), I board leaved weeds (Chenopodium album, Melilotus alba, M. indica, Anagallis arvensis, Lathyrus aphaca, Vicia hirsuta, Vicia sativa, Solanum xanthocarpum, Euphorbia dracunculoides) and one sedge type weed (Cyperus rotundus) in the fields of rabi crop of experimental field, in which dominant weed forms are Chenopodium album, M. alba, M. indica, Phalaris minor (Retz), Lathyrus aphaca (Yadav 1980;
Dhiman et al., 1982; Vaishya et al., 1988).

The competition of weed flora in the weedy check fields recorded at 100 DAS of wheat crop revealed the dominance of monocot weeds over dicot weed forms. The dominant dicot weed forms are Chenopodium album, M. alba, and M. indica (Tiwari, 1984) and Phalaris minor, Avena fatua, Cynodon dactylon and Cyperus rotundus (Laloo, 2003; Sister et al., 2004).

In a country like India where agriculture predominates, weed play a key role in its economy because these compete with crops for different growth factors such as nutrients, moisture, light and space, thus bringing about significant reduction in yield as well as in quality in wheat. For successful implementation of any weed control method. It is essential to have an adequate knowledge of weed flora of a particular area, wheat is grown under varying edaphic and climatic situations in India, therefore, the
occurrence of weed species and the nature of weed problems varies greatly.

Survey of weed flora of wheat grown in eastern part of Uttar Pradesh has been conducted by the weed scientists of NDUAT, Kumargarh, Faizabad during different year. It has been observed during the course of study that wheat crop was seen to be affected severely by divergent weed flora like Anagallis arvensis, Convolvulus arvensis, Melilotus alba, Chenopodium album, Melilotus indica, Spergula arvensis, Lathyrus aphaca, Vicia hirsuta, V. sativa, Euphorbia dracunculoides, Desmodium triflorum, Launaea asplenifolia, Crisium arvense, Asphodelus among dicot weeds, Phalaris minor, Avena fatua and Cynodon dactylon among monocot weeds and Cyperus rotundus among sedge. Late sown wheat crop was seen to be infested by eight weed species namely Phalaris minor, Cynodon dactylon, Chenopodium album, Polygonum plebejum, Vicia sativa, Anagallis arvensis, Melilotus indica and Cyperus rotundus and Vicia hirsuta, Cyperus rotundus, Anagallis arvensis.
Asphodelus tenuifolius, Phalaris minor, Chenopodium album, Fumana parviflora, Melilotus indica and Launaea asplenifolia and Phalaris minor, Cynodon dactylon, Cyperus rotundus, Anagali arvensis and Chenopodium album, Melilotus indica, Anagallis arvensis Crisium arvense, Phalaris minor, Cyperus rotundus and Convolvulus arvensis at CRS, Ghagrakhat (NDUAT,Faizabad).

Rice crop is infested with a number of weed species, emerging immediately after sowing. Major weeds like Echinochloa colonum, Cyperus rotundus, Digitaria sanguines, Ammania baccifera, Pimbrisstylis sp., Eragrostis sp. were found germinating almost simultaneously with rice crop.

In rice fields monocot weeds dominated over dicot weeds. Dicot weeds include Ammania baccifera, Eclipta alba (Molett, 2004; King, 1966; Madal, 1990). The perennial sedges like Cyperus rotundus and grasses like Cynodon dactylon pose major weed problem in rice fields (Pillai 1971).
The weeds like Eclipta alba, Euphorbia hirta, Phyllanthus niruri appeared in the last week of August followed by Echinochloa crusgalli, Lindernia, Corchorus acutangulus, Convolvulus arvensis and Cyperus irria.

Knowledge about the morphology of weed may be useful in selecting weedicides to be used. The plant may be so structured as to prevent contact of the chemical with its growing point as compared to exposed growing points of the weeds. The study of the morphology has been very important in respect of the use of chemical (foliar applied chemical; Mizguti et al., 2003). The morphological features of weeds enable them to compete with crop plants. Grass weeds compete more with cereals because they tend to have roots of similar spread and depth and broad leaf weeds compete more with broad leaf crops (Bhosle et al., 1988).

In wheat, Avena fetua, Phalaris minor (grassy weeds) both have high reproductive potential and also morphological
similarities to weed plant till flowering (Gill and Barr, 1975, 1977).

In rice, *Echinochloa* sp. and *Fimbrystylis* sp. are morphologically similar with rice make it difficult to identify the crop and weed easily. Similarities in various morphological features between weeds and crop plants definitely help in the safe growth of the weeds along with crop plants so they are not easily deflected during weeding (Benvenuti et al., 2003).

In many grassy weeds, the leaves are erect and narrow and may retain less chemicals during spray than dicot weed leaves which are broad and horizontal wax on the leaves. Young leaves are more easily wetted than mature leaves probably because the wax and cuticle are thinner and may not form a complete layer as the leaf grows older, the wax continued to be exuded from the epidermal cells permeating the cell wall and on the surface of the cuticle, hairs and spines on leaves and
stems prevents intimate contact with the leave surface (Procopia et al., 2003).

Herbicides being absorbed primarily through leaves and roots of plants, hence the internal structures of the plants are quite important in weed crop studies. Similar types of tissues like epidermis, hypodermis, parenchyma, collenchyma and vascular tissues are met with plants—roots, leaves and stems. The tissue system of leaf is continuous with similar tissues of stem axis. Conduction of exogenous chemicals from the leaf through the petiole of the stem is usually through the phloem of the vascular tissues (Cousens, 1985).

The foliar applied chemical have to traverse through barriers like surface waxes hair, cuticle, bark, epidermal cell walls and plasmalema, before they can be absorbed from plant surface into the epidermal cytoplasm. The cuticle is the most important determining the herbicide absorption by plants (Vasihya and Khan, 1986).
Leaves are less adapted to absorb and translocate foreign substances. The cuticle is probably most important barrier to exogenous chemicals. Leaves are thicker on upper surface than on the lower and hence the lower surface if more easily penetrable (Wolber and Breiding, 2003).

The stomata were present on the lower surface of all species except on Cynodon dactylon, Cynodon distance or Pimbristylis littoralis and that all had parasitic type of subsidiary cells, most have grass types guard cells of variable size.

The weeds had wide range of variations in their rooting patterns like depth of tap root, frequency, distribution and angular diversion of lateral roots and different zones of the tap roots.

Weeds harbour insect pests and serve as their alternate host which damage economic crops. Several weed plants have been found harbouring pathogenic forms during favourable or abnormal conditions
and facilitated the spread of epidemic or endemic disease in wheat and rice crops during investigation in 2004-2005 and 2005-2006. These findings are in confirmation with the observations of Srivastava (1979) and Mishra et al., (1972).

Several weed plants have been found harbouring pathogenic forms, as alternate host during favourable are abnormal condition and caused diseases in wheat and rice fields.

*Alternaria alternata, Alternaria longissima, Cercospora, betrundie, Phyllosticta cynodontics* infested with *Anagallis arvensis, Chenopodium album* and *Cynodon dactylon*, respectively and caused leaf blight and leaf spot diseases.

*Cyperus rotundus* and *Cyperus irria* were found highly infected with rust and leaf spot caused by *Puccinia romagnoliana* and *Carvularia tuberculata* respectively. Some other grassy and broad leaved weeds were, recorded as host of many fungal
diseases. These are *Echinochloa crusgalli*, *E. colonum* with *Helmenthosporium sativam* causing leaf spot disease *Vicia hirsuta* and *Vicia sativa* were infect with Downy mildew (*Pernospora vicia*) and rust (*Uromyces viciaefabae*). *Corchorus sp.* of weed are recorded as host of *Cercospora corchori* causing leaf spot diseases. These disease have been already reported by Srivastava, (1979). Actually weeds have not been causing crop losses only as competition with crop but also damage the crop or help greatly in the disease spread and losses due to the disease.

Various aspects related to crop weed competition and yield loss caused by the growth of weeds in rice and wheat crop fields are discussed in the present chapter.

The dominance of broad leaved weeds in the experimental plots of wheat and rice crop fields have been common experience during investigation. Broad leaved weeds contributed more to the total weed population (Rao and Singh, 1992).
Higher weed density and weed population in 2005-2006 as compared to 2004-2005 could be mainly attributed to change in the experimental fields and climatic conditions. Wide variations in weed density under different location and seasons has been confined (Rao and Singh, 1992).

Increase in dry production of weeds under treatment might be due to the fact that they enable of greater quantities of soil nutrients, resulting in to better growth and higher dry matter production. Vigorous growth of surviving weeds with the increased nutrients levels have been confined of Laloo (2003).

The density and dry weight of weeds in manually weeded plots were almost equal to that of unweeded plots at 20 DAS because by that time there was no weeding or hoeing.

During investigation, hand weeding at 40 DAS proved best in controlling the weeds by the lowest population of the
total weeds under this treatment after 60 DAS of crop growth. It is because the weeds emerged after weeding in this treatment were small in number and were smoother by the well established crop plants.

Dry matter accumulation by weeds slowly increase towards successive crop stages and reaches to the maximum at 60 DAS. The highest dry matter of weeds was recorded at all observations. Data in weedy check treatments as weeds were allowed to grow free and enjoyed all the growth factor more efficiently as thus accumulated higher dry matter. Under hand weeding treatments at 60 DAS, weed weight decreases drastically. The values were significantly lower than weedy check.

During investigation (2004-2005 and 2005-2006), highest dry weight of weeds was produced in the unweeded plots and thus there was removal of highest amount N.P.K. from the soil.
In general, manual weeding reduces the dry weight of weeds which helps in checking the loss of nutrients (Singh, and Chauhan, 1978).

The best index of plant and vigour reflected in its productivity, is the plant height. The plant height was influenced greatly by two hand weeding treatment during investigation on both crop. Better nutrition is caused greater elongation of stem as a result of rapid cellular multiplication within the plants (Chaubey and Singh, 1984).

The highest weight of grain was recorded by weed free treatment which was significantly higher than weedy check, HW 20 or 60, 20 and 60 days. The weedy treatment provided the lowest weight of grains in both wheat and rice crops.

Weed free treatment being with the hand weeding 20 and 60 DAS suppressed all the treatments in respect of grain yield. Weedy treatment recorded the lowest grain yield.
Thus, from the above findings it may be concluded that weeds are unwanted plant in the crop fields with negative role in agricultural sense at Parai belt of eastern Uttar Pradesh.