CHAPTER - V

DISCUSSION
In the foregoing pages the results of experiment entitled “studies on effect of integrated weed and nutrient management on productivity of fodder sorghum-mustard cropping system under rain fed condition” as influenced by different treatments have been presented. The results of this investigation have to be supported by prepared explanations before drawing useful conclusions. In this chapter, therefore, an attempt has been made to explain the observed variations in the light of the work already done by various workers.

**Growth, green biomass yield of crop in relation to weather**

The green biomass yield per unit area is a resultant of the interaction between genotype input management and environment. The environmental factors influence the morphological (structural) physiological (functional) aspects of the plants and finally the potential yield levels of crops in the present investigation the growth, green and dry biomass, protein and seed production were higher in kharif and rabi season of second year of experimentation (Table– T8, T10, T11, T13, T14, T18, T39). Weather conditions exhibited a strong bearing on the growth and yield of the crops and finally resulted in appreciable yield variations over the years. Through the total rainfall during the crop season of 2005-06 was higher (400.2 mm) as compared to 2006-07 (387mm) but its distribution was uniform in 2006-07. These rains were received in 21 days in 2005-06 and 26 days in 2006-07 indicating that rains were intensive during first year, which were not congenial for growth of the crops. The year 2005 – 06 had about 27 days drought spell from September 3rd to 30th. In this situation, sorghum crop suffered prolonged moisture stress during active vegetative growth, which caused general reduction in green biomass, dry matter and protein yield in 2005.
The mean maximum and minimum temperature in the July remained higher in 2005 as compared to 2006. This coincided with critical period (10 days) for germination and finely adversely affected seeding vigour, establishment and growth attribute of sorghum in kharif. The growth characters like plant height, Leaf area index, green and dry weight/m² were higher in 2006 as compared to that in 2005. These growth characters finally contributed for higher yield.

The mustard was grown under minimum rainfall and soil moisture condition during both the years. The plant height, LAI, number of leaves per plant green and dry weight of mustard, number of branches per plant per unit area was more during 2006-07 as compared to 2005-06. These attributes finally could increase the seed and stover yield production of mustard during 2006-07.

**Crop growth studies**

In the present experiment the weed control and nutrient level of fertilizer and FYM were used. The data of all the growth parameters viz. plant height, plant dry weight, plant fresh weight, number of functional leaves per plant, LAI of sorghum - mustard and total number of branches/plant of mustard in Table (8,9,10,11,12,28,29,30,31,32,33) revealed that hand weeding by khurpi at 30 DAS + 75% NPK + 25% FYM was superior and gave higher value of all parameters followed by isoproturon with 75% NPK+ 25% FYM as compared to hand weeding, weeder cum mulcher and isoproturon combination with 100% NPK (RDF) and 50% NPK (RDF) + 50% FYM. Application of 75% NPK (RDF) + 25% FYM provided good control over weeds there by reduced the competition between crop and weeds and consequently resulted in higher crop growth in both the year of experimentation. Similar observation regarding in maize; plant height, leaf area index, dry matter accumulation showed the best expression in the
treatments involving 75% of recommended NPK through fertilizers and substitution of 25% inorganic (NPK) by FYM (Pathak et al. 2002, Nanda et al. 1998), Suman et al. (2006).

Yield attributes and yield

All the yield attributes and yield parameters of fodder sorghum and mustard improved significantly due to integrated weed and nutrient management practices. The application of organic manures in these treatments (T4 to T9) decomposition in soil released the plant nutrients slowly throughout the crop growth and thus improved all the yield attributes and yields of both the crops. The yield attributes of mustard viz. number of siliquae per plant, number of seeds per siliquae, weight of siliquae/plant, weight of seed/silique and 1000 seeds weight were found maximum in hand weeding by khurpi at 30 DAS combination with 75% NPK (RDF) + 25% FYM. Pathak et al. (2002), Singh et al. (2006), Kumpawat (2004) reported similar results on surghum, mustard crops.

Green biomass yield of fodder sorghum and seeds and stover yield mustard was significantly higher with hand weeding by khurpi at 30 DAS combination with 75% NPK (RDF) + 25% FYM. This was followed by isoproturon @ 0.75 kg/ha + 75% NPK (RDF) + 25% FYM and hand weeding by khurpi at 30 DAS + 50% NPK (RDF) + 50% FYM during two years of experimentation. In general increment in fodder yield of sorghum was recorded in 2006 as compared to 2005. This difference in fodder yield and seed yield of mustard is mainly a reflection of variation in environmental condition of fields during these two years promoting better growth in 2006. The higher green fodder and grain yield might be due to higher supply of essential macro- nutrients through FYM, when these were combined with NPK fertilizer. The results were confined by Pathak et al. (2002), Singh et al. (2001-02), Rajkhowa et al. (2002) and Mishra et al. (2002). All weed control
treatments and nutrient sources have gave significantly higher green fodder and grain yield than control. Weedy check + 100% NPK (RDF) was also increase the yield of fodder sorghum and seed yield of mustard as compared to control but reduced the all other treatments. The favorable effect of yield may also be due to lesser competitions for nutrient between crops and weeds under fertility levels. Results obtained under increased nutrition corroborate with the finding of Angiras and Singh (1998) on hill agriculture of Himachal Pradesh.

**Quality Parameters**

Integrated approach of weed control and nutrient sources significantly influences the quality parameters viz. crude protein content, crude protein yield and oil content of seed (%). The crops weed control treatment were reduced the competition for nutrients, resulted the improvement in the quality parameters of crops while nutrient sources were help improved the quality attributes. The nutrient sources of 50 percent and 75 percent NPK through inorganic and 50 percent and 25 percent nitrogen through farmyard manure recorded significantly higher crude protein content, crude protein yield, and oil content of seeds of fodder sorghum - mustard cropping system over 100 percent NPK through inorganic source of fertilizer (Table 15,17,18,43). The similar findings were also reported by Hooda et al. (2002) in pearlmillet - wheat cropping system and mundra et al. (2002), Rajkhowa (2002).

**Population and Dry matter of weeds**

The important weeds infesting the cropped area were *Cynodon dactylon*, *Cyperus rotundus*, *Celocia argentia*, *Commilina bangalensis*, *Corchors facisularis*, *Echinocloa colonum*, *Digera arvensis*, *Elusina indica*, *Panicum repence*, *Digitaria sangunalis* in fodder sorghum and in mustard were *Anagalis arvensis*, *Chinopodium album*, *Cyperus rotundus*, *Cynodon*
dectylon, Lathyris sativa, Launea Pinnatifolia, Melilotus indica, Melilotus alba, Desmodium trifolium, Spergula arvensis, Vicia hirsuta, Vicia sativa etc. Among different weeds, that highest population was that of Celocia argentina (Appendix - IV, VI, VII, VIII, IX, X) followed by that of Cyperus rotundus in fodder sorghum and Chinopodium album was highest population in mustard followed by Cyperus rotundus (Appendix - XI, XII, XIII, XIV, XV, XVI). All the weed management treatments resulted in control of weed population as compared to weedy check + 100% NPK (RDF) and control. The lowest weed population was recorded in hand weeding by khurpi at 30 DAS combination with 75% NPK (RDF) + 25% FYM followed by isoporturon @ 0.75 kg/ha + 75% NPK (RDF) + 25% FYM and hand weeding by khurpi at 30 DAS + 50% NPK (RDF) + 50% FYM and highest population of all the weeds was recorded in weedy check + 100% NPK (RDF) and control. These results confined by Mishra, (2006) in wheat, Pandey, et al. (2002) and Saikia, et al. (2001).

Dry matter of weeds was significantly affected by different weed control and nutrient sources as compared to weedy check + 100 NPK and control. Hand weeding by khurpi at 30 DAS combination with 75% NPK (RDF) + 25% FYM observed significantly lower dry matter of weeds than other practices. Among the remaining treatments such as weeder cum mulcher and isoproturon with different level of nutrient sources gave the lowest dry matter of weeds compared to weedy cheek + 100% NPK (RDF) and control. The highest dry matter of weeds was found in weedy cheek + 100% NPK as compared to control because this treatment gave the favorable condition for more uptakes of nutrients, as also reported by Butter and Aulakh (2003) also reported similar findings.
Weed control efficiency and weed Index

The highest weed control efficiency and lowest weed index was recorded with the application of hand weeding by khurpi at 30 DAS combination with 75% NPK (RDF) + 25% FYM. Other weed control treatments were gave the higher values as compared to control in fodder sorghum and mustard. The increase in weed control efficiency at all stage due to significant reduction in dry matter of weeds (Table 22,23,48,49). Sharma and Subhash Chander (2006) also reported that weed control efficiency was 71.3 to 96.90% at 30 and 45 DAS being maximum with hand weeding while, lowest weed index (3.3) in one hand weeding at 30 DAS.

Nutrient uptake

The NPK uptake by weeds decreases significantly by applying various weed control measures. The lowest nutrient uptake was recorded by hand weeding by khurpi at 30 DAS + 75% NPK (RDF) + 25% FYM. However, it was at par with that of isoproturon @ 0.75 Kg/ha + 75% NPK (RDF) + 25% in fodder sorghum and mustard crops (Table- 21,47) as comparatively weedy check + 100% NPK (RDF) and control. Pandey and Belle (1998) reported similar findings.

The uptake of nutrient by the crop was significantly higher with application of hand weeding by khurpi with combination of 75% NPK through inorganic fertilizer and 25% organic sources followed by isoproturon @ 0.75 kg/ha with 75 and 50 percent recommended dose of fertilizer along with 25 and 50 percent FYM and hand weeding by khurpi at 30 DAS + 75% NPK (recommended dose of fertilizer) + 25% FYM (Table- 16, 43). Combined use of inorganic and organic sources of nutrients resulted in significantly higher uptake compared to the fertilizer alone. Weed control treatments significantly increased the uptake of nutrient by crop than weedy check + 100% NPK
(RDF) and control, similar finding was also reported by Rajkhowa et al. (2002).

**Soil fertility**

The Soil pH was higher with hand weeding by khurpi at 30 DAS + 75% inorganic fertilizer + 25% FYM. While, maximum EC was found in isoproturon @ 0.75 kg/ha + 75% NPK (RDF) + 25% FYM as compared to control, which is marginal increased may be ascribed to the formation of acids during mineralization and decomposition of organic matter and inorganic fertilizer. Similar results were reported by Kumar et al. (2001). Integrated use of organic and inorganic fertilizers improved the organic carbon, pH, available NPK as compared to inorganic fertilizer alone and control. The maximum organic carbon, soil moisture and available NPK (Kg/ha) were obtained with weeder cum mulcher + 50% NPK (RDF) + 50% FYM. Singh et al. (2002) reported similar result that improvements inorganic carbon content and available nitrogen, phosphorus in soil with the combined use of organic fertilizer. Similarly results was also reported by Singh et al. (2002) that soil analysis results shows that the 50% substitution of recommended of nitrogen through FYM registered increase in organic carbon and total nitrogen, phosphorus.
Economics

Maximum gross income and net return were recorded the application of hand weeding by khurpi at 30 DAS + 75% NPK + 25% FYM (Rs 47050.50 and 23120.71/ha), respectively. The maximum net return (Rs 23120.71/ha) was found with hand weeding by khurpi at 30 DAS and isoproturon @ 0.75 kg/ha (Rs 23009.86/ha) with 75% NPK + 25% FYM both treatments due to less cost of cultivation, increment of yields as compared to other weed control treatments with 100% NPK (RDF) and 50% NPK (RDF) + 50% FYM. These results are in close agreement with the findings of Naik, et al. (2001). Maurya, et al. (2002).