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Tillage, Mulching and Nitrogen Based Weeds in Wheat and its Impacts on Yield

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Abstract--- *In the production systems, weeds play an important role. They compete with water, nutrients, and air and light crops, resulting in poor cultivation. Many small leavened, large leavened and grassy weeds are associated with the wheat and ultimately reduce the yield of grain. In many regions of South Asia, weeds are the main restrictions on wheat production. More than 90 weed species infecting this crop in the Indian Subcontinent are estimated to be 20-40% dependent on weed species, and the direct yield loss caused by mixed weed flora. In Nepal, weeds can reduce the wheat yield by as much as 50 percent, depending on the severity and species of weeds, sometimes even higher. Several studies have shown that stroke mulch reduces the amount of grassy and broad blade weeds to 80% in wheat. Tillage is a significant factor in weed management program. Surface seed technology or zero tillage is becoming more popular in wheat production as the occurrence of the most troublesome weeds Chenopodium album L. and Phalaris minor Retz has decreased. Soil condition has improved due to decomposition of crop residues, infiltration rate increases, reduced preparation cost and pre-sowing of the rice-wheat process in wheat. The use of the lower dose of nitrogen is shown to be minimal weed dry and increased significantly with the higher nitrogen level.*

Index Terms--- *Chenopodium album L., Crop residues, Mulch, Nitrogen, Phalaris minor Retz, Tillage, Weed.*

I. INTRODUCTION

Many South Asian scientists claimed that weeds are the major limitations on the cultivation of wheat. Weeds are the unwanted plants that kill and adversely affect different crops. The inhibition effect of weeds on crop plants has countless reports. Weed cultivation is generally complicated by the competition of weeds in competition with crop plants by occupying an area otherwise accessible to the crop plant. Anything that reduces this area reduces plant development. The water requirement for weed growth is of primary interest from the point of view of competition for sufficient moisture for the crop plant. Wild mustard has been reported to have four times more water than a crop [1], [2]. Studies show that the impact of the competition for light is determined by the weed and canopy structure in particular plant height, location, branches and height, which consequently have a major influence on crop yield. Increased mineral nutrient consumption in weeds often has a considerable competitive advantage over crops. Wildlife is used as alternate hosts to insects, pathogenic fungi and nematodes. Fusarium species of winter wheat are isolated by common broadly leavened weeds. Approximately 80 per cent of the global production of cereals comes from wheat, maize and rice, but the production of these unwanted crops is greatly affected [3], [4]. The world's largest cereal is

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wheat (Triticum aestivum L.) The globally declining weed yield has been estimated to be 13.1% or more in some cases, a huge loss to food self-sufficiency. Pakistan is an agriculture country with a production of 19,183 m tonnes, average grain yield 2388 kg ha-1 and wheat is a main crop grown in the period 2002-2003 on an area of 8.0339 m ha. The weeds play a major role among the different factors that cause low yields in Pakistan. In various wheat growing areas in the country, up to 45 weed species have been reported. Another significant factor in the weed management program is tillage. The weed population was greatly influenced by different tillage practices. Surface seed technology or zero tillage is becoming more popular in wheat production as the occurrence of the most troublesome weeds Chenopodium album L. and Phalaris minor Retz has decreased. Soil condition has improved due to decomposition of crop residues, infiltration rate increases, reduced preparation cost and pre-sowing of the rice-wheat process in wheat. The method of tillage also influences vertical distribution in soil and plant abundance of weed seed [2], [3], [5]–[7]. A no-till planting system leaves most weed seeds in top 1.0 cm of the earth profile while in the deep tillage, the weed population has been reduced significantly as a result of soil reversal with plough on the mold board resulting in the deeper placing of most weed seeds not created.

II. DISCUSSION

II.I. Weed Flora of Wheat:

Many grassy and large leaf weeds are connected to wheat, which can rely on so many factors like the location, the soil fertility, and management, etc. Amongst them,Chenopodium album (23.3%), Gnaphalium affine D Don (33.5%), Digitaria sanguinalis (L.) Scop.(14.8%), Polygonum plebeium R. Br. (15.2%) and Cynodon dactylon (L.) Pers. (13.6%) had higher relative abundance value (13.6 percent) than that of other weeds. Similarly, a researcher stated that Chenopodium album, phalaris minor and Rumex acetosella L. were the major problem weeds of wheat in Pakistan. Hobbs (1990) reported A. fatua, Lathyrus aphaca L., C. album and P. minor as the major weeds of wheat in India. Similarly, it has been recorded that P. minor, C. album, C. dactylon, Anagalis arvensis L., A. fatua and Vicia sativa L. as the main weed species in northern mount region of Madhya Pradesh and Chhattisgarh in India. Some scientists in Orissa have reported 20 weed species related to wheat plant[8], [9]. The different types of dicot and monocot weeds that infest wheat cropped in Bihar, India have been identified. Among the wide weeds, Fumaria parviflora Lam., C. album, Oxalis corniculata L., Trigonella polycerata, Melilotus indica (L.), Spergula arvensis, Nicotiana plumbaginifolia Viv., Convolvulus arvensis L. and Lippia nodiflora (L.) and in grassy weeds case A. fatua, P. minor and C. dactylon and Cyperus rotundus L. mainly infested the cultivated area between the sedges. The population of weeds ranged from 4.30 to 60.04 m2 in Jabalpur, India at the wheat harvesting level. In combination with the weeds, a large number of weeds were identified in the Kirtipur region of Nepal. The main weeds reported were C. album, Cannabis sativa L., Vicia spp. and P. minor. In 2001/02, the normal weeds were P. minor, C. album, stellaria media, Alopecuros sp., Bothiospermum, Polygonum hydropiper L., senecio vulgaris in the experimental area of Khumaltar in Nepal. Amongst them C.album is the dominant weed in all wheat fields from 500 to 900 for a surface area of 0.5 m2. In 2004-2005, another experiment identified various types of weeds such as P. minor, stelleria media, Alopecuros aequalis Sobol., C. Album, Gnaphalium affenes, soliva anthemifolia (Juss.) R. B., Vicia spp, A. Arvensis. in the field of wheat and so on. Among them, C.

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album, A. aequalis, P. Minor and S. anthmifolia have been commonly reported in wheat. A researcher has recorded sixty four weeds species of wheat from Nepal's Kabhre and has identified 9 weed species such as A. aequalis, Polypogon fugax , C. album , P. minor , Nees ex Steudel , A. fatua , P. plebeium, Stellaria uliginosa and S. anthemifolia are abundant in wheat. Wide leaf weeds such as C. album, Fumaria sp. and the Ageratum sp. are Nepal's largest weed flora in Chitwan. In Rampur, Chitwan, Nepal, 30 weeds belonging to 16 families and 25 genera have been discovered. Twenty-eight was annual and two were permanent[10]. C. album, A. houstonianum, D. adscendens and C. dactylon were major species of weed at IAAS.

II.II. Yield Loss in Wheat Because Of Weeds:

Throughout production systems, weeds play a vital role. They compete for water, air, nutrients and light with crops. In many regions of South Asia, weeds are the key constraints for wheat growing. In the Indian subcontinent, over 90 species of weeds infest this plant and direct loss of yield because of mixed weed flora varies between 20 and 40% according to species. A scientist reported the major reason for weed infestation in Pakistan to be 25-30 per cent less than wheat yielded. There are also several different reports that weeds have caused wheat loss in India, like 10-50%, 34.3% and 10-80%. Similarly, the wheat yield reduced in mid-hill northwest hills in the Himalayan region of India by 28.9-52.2 percent and 29 percent due to season long weed competition. A researcher reported a significant decline of plant height of wheat, production tillers of m-1 length, 1,000 grain weight and grain panicle-1 and a 27.2 percent lower crop yield due to competition from weeds. The weeds in the Northern Hill area of Chhattisgarh, Madhya Pradesh, India display a 30–50% reduction in wheat yield due to heavy infestation. In the same way the impact of C. album has been investigated by uncontrolled weeds, which have caused 30.68 percent loss in grain in the wheat. Competition for C. album growth and wheat yields, and the largest decline on wheat yield under weedy command was due to a reduction of 31% of the total tillers per crop, the decrease of 43.34% of active tillers per plant, the decrease of 14.57% and a decrease of 34.5% of total dry weight of wheat. In Nepal, weeds are estimated to reduce wheat yields by up to 50%, sometimes even higher depending on weed gravity and species. Similarly, loss of productivity in weeds of wheat in the Kabhri district of Nepal is 8-37% with an annual incidence rate up to 100% and a national productivity loss annually up to 6-10%. Similarly, weeds in Sipaghat, Kabhri district of Nepal, indicate 33% losses in wheat.

II.III. Weed and Plant Yield Based Tillage:

The productivity of grain yields and the amount of active m-2, respectively zero tillage, increased by 7.7 and 6.6 percent in comparison to normal tillage, as a result of improved planting due to lower weed competition. Deep tillage significantly reduces the population of weeds compared with zero-tillage due to the deep placement of the most weeds that could not emerge from it. Similarly, significant reductions in dry weight of weeds are observed with zero tillage over traditional surfaces. Zero tillage or seeding on the ground reduced P. minor and C. album infestation but increased the wild oat problem. But the deep frequent tillage brings more rhizomes and dormant weeds to the surface of the soil and preserves them close within the ground, which is unwanted in the future. Specific laying practices and weed management practices have shown significant effects on wheat production. A researcher found the maximum number, in zero tillage but more C. albums, Poligonum sp., P. minor and Cannabis sativa L., of A. arvensis, S. anthmifolia and Alopecuros Sp. in normal tillage. Dry weight in both years was lower in reduced tillage and natural in comparison with

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zero tillage. In normal tillage, however, the highest yield was reported. The reduction in tillage and zero tillage are equivalent. In zero tillage, grassy weed was lowest, but equal to normal tillage. In normal tillage, the highest blade weeds with lower reduced tillage were reported (Chinese seed drills). Grassy weeds and Broad leaf have respectively removed more NPK in zero yields. No particular weed species correlated with systems of tillage and suggested that both systems of tillage have the same type of weed but with different intensities. In both laying systems there were narrow leaves rather than broadleaves. A. aequalis and P. minor were the most common narrow weed species leaf and C. album, C. didymus, S. media, R. crispus. and S. anthemifolia were broad-leaf dicot. A. aequalis, S. media, P. minor and R. crispus population were higher than in the minimum tillage for conventional tillage. The overall population of narrow leaf weeds in conventional tillage was higher at 4 and 8 weeks after the seeding of wheat, compared to conventional tillage or zero tillage, with reduced tillage yields. Under conventional tillage Polygonum convolvulus L. was abundant but S. vulgaris, Galeopsis tetrahit L., Taraxacum officinale Wigg., Polygonum scabrum Moench. and Equisetum arvense tended under a zero tillage system to have higher populations. Due to reduced demands on layer and herbicide, the reduced system is economical and environmentally desirable too. Less density in weeds than in the minimal and conventional tillage systems and perennial weeds in the no-tillage were also reported while wide annual leaves of species associated with the minimum and conventional plot in tillage were reported. In the 30 day span and highest average grains (3872 kg ha-1), and biological yield (10536 kgha-1) was achieved in zero tillage-free situation which was equally suitable with conventional weeds, more weeds emerged in conventional tillage (146 m–2) and reduced tillage (141 m–1) than those found in the zero-tillage (103 m–2) method. In conventional method of wheat sowing, the P. minor density and dry weight remained significantly higher than zero-tillage through the cultivation season. Traditional laminating decreased weed density considerably, creating a remarkable decrease in the density of weeds (50%) and dry weight (55%) compared with zero. The weeds are reduced significantly by the traditional tillage. Fewer weed infestations with conventional tillage over zero tillage (weed density and dry weight). The tillage practices did not affect weed intensity; however, conventional tillage did not significantly reduce the weed density and dry weight as opposed to zero tillage.

II.IV. Mulching in Relation to Crop Yield and Weed:

The weed density and dry weight of straw mulch were significantly reduced by dry weight and weed density; either in flat beds or ridge, and dry weight m –2 was substantially lower than that of flat beds. Rice straw mulching has a major effect on soil moisture conservation, root growth, and weed growth reduction which, in the end, improves no-till wheat grain yield. Stroke mulch has suppressed up to 23 per cent narrow leaf weeds and up to 36% broadleaf weeds compared to 4 weeks following wheat sowing. Similarly, rice paw mulch was more effective in eliminating weeds in wheat, with a combined root growth and water consumption of 120 kg of nitrogen and mulched treatment per hectare. Control of weeds (23 percent) and increase grain yields (9.3 percent) in soybeans was effective at mulching @ 5 t ha-1. In addition, the wheat yield increased by 16% compared with no mulching when mulching were done with pine (Pinus Sp.) @ 10 t ha-1 just after seeding. The impact on wheat plants during the sixth week of planting, of rice straw mulching (4 t ha-1). In all mulched treatments during this process of testing, the wheat plants are dark green. The stubble mulch reduced both the grassy and small leaf weeds to 80%, thereby raising the wheat yield. In contrast with no

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mulch treatments, tiller wheat was more in mulch. In the fields of scientific research weeds such as Rumex sp., C. album, P hydropiper, S. media, S vulgaris and C. sativa among them Alopecuros sp. and P. minor, were the dominant weeds. Similarly, in wheat crop areas, the C. album number varied between 500 and 900 per 0.5 m2. This weed was reduced by 200 to 399 per 0.5m2 with rice-straw mulch. During the sixth week of planting, the effect of mulching on weed plants was observed. In all mulch applications, the wheat plants are dark green for contrast to no mulch. More tillers m-2 and grain production were also available in mulched plots. With growing mulch levels (50 q ha-1) than no mulching, plant count and weed biomass decreased. When straw mulch was applied at 4 t ha-1 level, the weeds had a weed control of approximately 50 percent compared with the weeds without mulch. Mulch decreased weed density and dry weight m-2 respectively by 31 and 46.9 percent over no mixture and significantly more yields of grain and straw than non-mulching crop.

II.V. Nitrogen in Relation to Crop Yield and Yield:

At a minimum the dry weight of weeds was 120 kg N ha-1 and in the weed field increased substantially to 180 kg N ha-1. Upon isolation and in combination with a narrower round distance of 15 cm, NPK (100:50:50Kg Ha-1) was considerably lower in weed populations reported. In many agricultural plants, the leaf growth and the root growth was more prone than crops to higher nitrogen levels. The indiscriminate use of nitrogen fertilizers will benefit weeds to the cost of crops. Late nitrogen application increased the weight of the plant, and the impact on the wheat yield loss of Veronica hederifolia was lower. A single application of nitrogen at tillering stage resulted in peak yield losses and indicated that a favorable modification of the nitrogen dose would be necessary to increase the determination of yielding components not affected by cannabis. A. ludoviciana and Melilotus indica L. have significant effects on nitrogen. The population of A increased with a use of 40 and 80 kg N ha-1. 54.5% and 65% ludoviciana over no nitrogen show that nitrogen fertilization favored the growth of wild oat inhabitants. With an increase in added nitrogen, weights in grass weeds, primarily wild oats, rose at 60 and 120 DAS. When a crop has been supplied with 40 and 80 kg N ha-1 respectively over-controlling, weed produced 183.9 and 275.9 million additional dry matter. With increasing levels of nitrogen, weed counting and weed dry biomass have increased and reported significantly higher values of 100 kg N ha-1 in each phase. An increase of the amount of nitrogen used was not increasing weed germination, appeared to reduce both the wheat and the barley overall weed biomass of each of the different species, but the weight of dry weeds with at least a weight of 120 kg and up to 180 kg N ha-1 was important. Furthermore, the yield was substantially improved with zero tillage due to less accommodation, better use of water and other favorable factors in higher N grades.

III. CONCLUSIONS

In many regions of Southern Asia, weeds are the major constraints for wheat growing. We absorb nutrients and moisture more rapidly and reduce the yield of plant crops. Three key aspects are also harmful: the reduction of crop yields through rivalry, increases farm costs and reduces product quality. Over 90 species of weeds in the Indian subcontinent and direct loss from yields due to the weed flora have been recorded to range from 20 percent to 40 percent depending on the species of plant. In Nepal, weeds can, depending on the gravity and the weed type, reduce

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wheat yield to up to 50 percent, sometimes even more. Another key factor in the weed management program is tillage. Zero laying or surface seeding technology is becoming more popular in wheat farming, not only reducing some problematic weeds, but also improving input efficiency and reduced preparation costs for seed bed. Mulching has shown that both grassy and broad-leaven weeds are reduced by various studies. The stub mulch suppressed both grassy and wide leaf weeds, which obtained a higher yield of wheat. The minimum dry weight of 120 kg N ha-1 weeds is also recorded and in the wheat field up to 180 kg N ha-1 has been significantly increased.

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