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Efficacy of Different Post Emergence Herbicides Against Weeds of Different Cereal Crops

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***Abstract*—**This Diagnostic study is essential for suitable weed management and it is designed to find out the comparative efficacy of monocot and dicot weedicides, proper recommendation for practical weed control in crops to enhance the yield. For the self-sufficiency herbicide's use has proved an effective tool during the previous decades. Weeds control cannot be effectively managed simply through physical method; it is not only labor intensive but resources intensive too. For the effective weed management in crops of all types and keeping in view the rising cost of power and labor, the sensible use of herbicides as time demands, is the only acceptable way.

***Keywords*—** Monocot, Dicot, Weedicitdes, Cereal Crops

I. Introduction

Herbicides are chemical compounds capable of elimination of plant growth or to kill severely injuring plants called weeds. Weeds are plants either wild or cultivated, undesired in a particular place. Weeds are conveniently divided into monocotyledonous plants (grass weeds) and dicotyledonous plants (broad leaf weeds). These weeds compete with crop's resources as light, water and above and below the surface nutrients causing estimated 9-10% yield loss. Cereal crops are wheat, rice, barley, corn and soy bean which are the staple food worldwide. For low productivity of these crops, weed infestation is a basic and major component in crop production system along with many other reasons. Commonly observed weeds of these crops are Lathyrus aphaca, Galium aparine, Convolvulus arvensis, Anagallis arvensis, Emex spinosa, Coronopus didymus, Medicago polymorpha, Melilotus indica and Cirsium arvense, Chenopodium album, Fumaria indica, Rumex dentatus, Phalaris minor, Chenopodium murale, and Avena fatua. Testing of graminicides indicates the problem posed by grasses whereas some broadleaved dicot weeds are also very competent towards the use of crop resources.

Herbicides help to economies yield loss in crop production by reducing the risk of weeds. Globally in the production system of all these crops, use of herbicides plays a vital role. Chemical control of weeds by using herbicides has replaced both manual and mechanical traditional control methods and enabled improved survival for development of large farm size to increase the productivity. But with the passage of time resistance is limiting to specific herbicides is a matter of immense concern for crop growers. In the corn crops, mostly documented Triazine resistant lamb's quarters and pig weed is a well renowned problem as resistant weeds. Due to use of Atrazine based chemicals over many years, these weeds developed resistance against this particular active chemical ingredient of Triazine and herbicides having same mode of action may be ineffective for some of such weeds populations.

Crops also have defensive mechanism to detoxify many herbicides in order to limit the damage from phototoxic compounds. Many factors are involved in the potential for significant crop injury from particular herbicide based on the rate and type of herbicide applied. Therefore, to check the efficacy and extent of resistance, herbicides are classified into groups based on mode of action, chemical composition and time of application etc. some herbicides may fall into more than one herbicide group having two or more active ingredients [2].

II. Study Intentions and Significance

Herbicides use resulted into the control growth of weeds but not removal of weeds from crop; rather, they resulted into other influencing factors as continuous selection of such plants which not only survive but also reproduce. As a result, such tolerant weedy plants with effective adoptive and well modified survival properties become dominant. Hence they distribute and cover ever more large areas leads to increased control costs, stress to crop and reduced yields, and stress. First case about both mono- and dicotyledonous weeds resistance against herbicides was reported in 1970 and from that time herbicides have become a worldwide problem. The International Survey of Herbicide-Resistant Weeds in the end of 2010 recorded total biotype 348 which are herbicide-resistant. 194 are weed species, with 80 monocotyledonous and 114 dicotyledonous [7]. Traditionally, depending on the cropping system, repeated and over use of same herbicides again with similar mode of action resulted into quick herbicidal resistance.

In order to cope with such situation a classification system is developed to easier the management and recommendation of herbicides if the site of action of herbicides are easily and readily available. Therefore, for the discovery of new classes of herbicides with new compounds and new modes of actions can be characterized by exploring novel targets. In complex with herbicide, knowledge about target site proteins and their atomic

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structure is important to know initial biochemical response against following applied herbicide.

III. LITERATURE ANALYSIS

Different weed communities in different localties of Toba Tek Singh were explored by quardrate method in Rabi season 2006-07 [11]. From these sites different weeds were collected and most commonly observed weeds were grassy weeds which were recorded in almost each sites. Most frequent and dominant specie were Phlaris minor and Avena fatua with an average frequency of 84 and 72%. On the basis of Important Value Index different families were dominant in specie terms i.e. Chenopodiaceae (4 spp.), Astraceae (7spp.), Poaceae and Fabaceae (6 spp.).

Efficacy of different weedicides such as Buctril super, Lanceolate star, Logran extra, Buctril-M against different broad leaf weeds i.e. annual or perennial in wheat field were observed by [1] during the Rabi season in year 2003-04 and 2004. Comparative efficacies of different herbicides were investigated during the experiment. Chenopodium album and Rumex dantatus were completely controlled by all herbicides. Convolvulus arvensis was poorly controlled by Long extra while Galium aparine and Lathyrus aphaca were controlled by Lanceolate star and Strive-M. In comparison of all herbicides best dicot weedicide was known to be only Lanceolate star which gave more yield i.e. 26% as compared with control.

[4] Conducted a maize field experiment at Tehran in Iran to test the best integrated management system. It was resulted that grain yield of maize was less in single row (SR) planting pattern than double row (DR) planting pattern. Double row planting resulted into almost increase of grain yield up to 1.0 t/ ha. In both planting patterns other preemergence herbicides were tank mixed with Atrazine and they significantly resulted into increased weed control. Best results were obtained using Atrazine plus Alachlor with dose of 1.0 kg ha-1. Highest grain yield obtained by Nicosulfuron and Foramsulfuron also had highest grain yield with dosage of 37 g a.i./ha. Then it was concluded that integrated weed competitiveness with crop of maize can be best managed with reduced herbicidal mixture and appropriate dosage.

[8] By comparing data from existing weed scouting data of over 200 fields of Zea mays L. (corn), Arachis hypogaea L. (peanut), Glycine max (L.) Merr. (Soybean) and Gossypium hirsutum L. (cotton) used to compare efficacy and different management strategies outputs. G. hirsutum, G. max and Z. mays, fields were planted with a glyphosate-resistant cultivar by assuming either no single herbicide-resistant weed specie, or at least one resistant weed species in each testing field. Resulted data after different assumptions of herbicides resistance was used to estimate net return about weed densities and yield loss after treatment for each field. It was concluded that net return and yield losses was impact of a resistant weed species, herbicide selection, densities and identities of present weed species and available herbicide options. All these factors vary from field to field. But generally, net yield return decreases due the presence of a resistant weed species whether decisions were made on minimizing yield loss, optimizing net return, or minimizing density of the resistant weed.

Many well-known weed control methods are used to notice the effect in response to maize for the integration of these control methods for the production of maize in 2011 and 2012. [5] Conducted an experiment for the best evaluation of strategies which are best and have less cost. These treatments had three practices of weed control included Metribuzin+hoeing at once 40 DAS, twice 25 hoeing and 40DAS and Giza 128, Giza 310 and Giza 329 were three cultivars of maize which were used by the use of configuration and planting rows. Metribuzin+hoeing resulted into 90.5% and 70% reduction in dry weight of weeds. For the height of maize plant as well as leaf area index hoeing twice usage was a most applicable method. It also affects the grain yield. In plant of Giza 329 poor light transmission was shown which caused increase in height as compared to other cultivars. For the production of grain yield and weight of 100 kernels was observed in Gizza 128 which show superiority in these factor's production. In those maize plants which were intercepted with more light and showed more LAI in twin rows and also showed no variation in height, dry weight, number and weight of kernels and grain yield. Increased in grain yield was favoured by Metribuzin+hoeing.

IV. DISCUSSION AND RECOMMENDATIONS

For herbicides action approximately there are 20 different target sites. 75% of herbicide sales represent 6 mode of action [3]. Herbicide's mode of action tells how the herbicide actually affects weed physiology and gets into the plant. Simply herbicide rotation or use of different herbicide may not give possibly effective and desired effect as easy as it sounds. Two different herbicides having same mode of action for a particular weed could illicit the same resistance response. In order to explore toxicological properties, understanding about herbicidal mode of action can be an effective tool to handle weed resistance problems in research for improving application methods in various agricultural practices [6]. For example, both Triazines and Simazine have same mode of action but Triazine resistance may still encourage after switching of Atrazine to Simazine. Recent studies haves suggested that weed populations shifts and resistance of weeds occur more quickly than we expect [9]. Statistical observations and results tells that method of application, application frequency and dose rates, have been changed with the passage of time with increasing resistance in weeds. For example, record from 1996 in USA explain that in soybean Glyphosate was applied on average 1.2 times at 841ga.i.ha−1; in 2000 this was increased to 1.4 applications (at 1065ga.i.ha−1) and then to 1.7 applications (at 1569ga.i.ha−1) in 2006 [10]. Same trends are observed for soybean, cotton and corn in other countries like Brazil and Argentina.

Recommendation to manage and prevent resistance is to rotate herbicides with different mode of action and site of action. Therefore, for herbicide's rotation strategy, knowledge about herbicide's site of action is the key to this plan. Herbicide site of action on the label is simple and practical approach for notation that allow quicker recognition of the site of action by growers and consultants. Ranking of chemical

families of herbicides by their potential to result in herbicide-resistant weed biotype and grouping numbers can assist in herbicide rotation program. In each group all herbicides do not have the same weed control spectrum and it is very important to know. In the same group, some products have drastic control differences while others have very subtle differences from each other. As Hexazinone herbicide has a much broader spectrum to control weeds (grassy, broadleaved and woody perennials weeds) than Terbacil (grasses and annual broadleaved weeds). There are also many other ways to cope with developed weed resistance by using integrating control strategies as physical weed control (tillage), robust crop rotations and herbicides rotation with different modes of action.

V. CONCLUSION

Neither single weed management tactic nor cropping systems can solve specific weed problems for long time. For long term goals of agricultural, by use of all possible practice herbicide resistances can be managed in an integrated fashion. In the developing world growing demand for herbicides associated with herbicide resistance is increasing research for new herbicides development. Strategies to discover new herbicides have been shifted to in-vitro molecular targets than testing of molecules. Rare genotype of weeds becomes selected for resistant to herbicide with the continuous application of herbicide when these are eventually cross-resistant with other not previously used herbicides. It is possible that these genotypes may already exist in very low frequency in a weed population before the application of selecting herbicide.

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