Proceedings of the Annual Conference of Indian Society Weed Science Held on March 3-4, 1992 at C. C. S. Haryana Agricultural University Hisar

Session 1

Weed Distribution, Crop Weed Competition, Allelopathy and Weed Biology

Chairman : Dr. V. N. Saraswat Co-chairman : Dr N. V. Reddy
Rapporteur ; Dr. A. K. Gogoi

Number of papers received were 65. Mr. Samunder Singh from HAU. Hisar reported that *Avena ludoviciana* and *Phalaris minor* were the dominating weeds in 10 out of the 16 Districts. *Polypogon monspelensis* and *Circium arvense* were found to be on the increase in the irrigated areas. *Carthamus oxyacantha* was found to be retreating in all zones. *Rumex maritimus* and *Medicago denticulata* have replaced *Chenopodium album* in the eastern zone. C. *album* is the most dominating weed in the soils irrigated with saline and sodic water. In another paper *Paspalum paspalodes* and *Eragrostis* spp. were found to have increased in rice. From Punjab the data indicated that *Avena ludoviciana* is increasing but *Phalaris minor* still continues to be the most dominating weed. In rice *Cyperus kyllingia* and *Sagitaria guyanpensis* are the new emerging problem weeds. *Chenopodinm album* was the most dominating weed of Sultanpur, Gorakhpur and Maharajgunj Districts of eastern Utter Pradesh.

The presentations on weed crop competition indicated the importance of early season weed control in *kharif* crops. Work from Jabalpur showed that maximum energy utilisation by weeds was in the untreated weedy check. The energy utilisation was less in the hand weeded plots as compared to the herbicide treated plots. The critical period of crop weed competition in rapeseed was 10 to 40 days after sowing in Jorhat (Assam) condition. The crop geometry of groundnut was found to have no effect on the nutrient uptake by the associated weeds at Hisar. Dr. J. N. Singh from Pantnagar reported that weeds reduced the fresh herb and oil content of Japanse mint by more than 75% and crop required weeding upto 75 days after planting.

The paper presented on allelopathy indicated that boiled water extract of *Imperata cylindrica* inhibited germination of cereals, pulses, vegetables and oilseed crops.

Seven papers were presented on weed biology. Scientist from Jabalpur reported that the stomal conductance of *P. minor* was more than wheat. Unshaded wheat leaf had more photosyntic rate as compared to middle shaded leaf. Efficiency of isoproturon was more in wheat plus *P. minor* ecosystem. N. T. Yaduraju from Delhi reported that polyethylene mulch used for solarisation for 32 days decreased the emergence of *Dactyloctenium aegyptiacum* and *Trianthema portualcastrum* by 90%. The population of nematodes was decreased by solarisation. The effect was visible only for 70 days. Dr. S.M. Kondap from Hyderadad emphasised that *Cuscuta* did not require any host stimulus for germination. Among pulse crop, penetration of *Cuscuta* was greater in green gram than black gram. In oilseed crops penetration was deeper in sunflower. No penetration of parasite in cerals was due to several layers of selarenchymatic tissues below the epidermal layer. The work done at N.R.C. Jabalpur showed that *Parthenium hysterophorus* growth could be biologieally controlled by innoculation of *Cuscuta reflexa* Roxb. twines. Growth of water hyacinth was suppressed completely by a spray of plant extract of *Parthenium* at the rate of 1.5 to 2.0 kg green matter extract/ litre. R.D. Singh from Jabalbur presented the data on the occurrance of crop plant viruses through pernnial weeds. P. Ramesh from Palampur highlighted the role of chrysomelid beetle on *polygonum hydropiper* and tartoise beetle on *Ipomoea purpurea.*

Session 2

Weed Management in Wheat

Chairman ; Dr. D. S. Malik Co-chairman : Dr. M. K. Porwal
Rapporteur : Dr. Samunder Singh

Out of 22 papers, 16 were presented. Besides herbicidal control, cultural practices namely row spacing, seed rate and sowing direction have a vital role in controlling common broadleaf weeds. Closer row spacing and/or cross sowing of wheat caused reduction in weeds growth.

In wheat fields, besides common broadleaf weeds, Phalaris, Avena and *Circium* are major problem. Successful control of *Circium* was reported with post emergence application of clopyralid (0.10 to 0.15kg/ha) and of *Phalaris* or *Avena* with isoproturon or metoxuron. Tralkoxydim also provided excellent control of Avena. Application of fluroxypyr 21 d.a.s. (before first irrigation) at CRI stage was better than applied at 15,30 and 40 d. a. s.

Further, tank mixture of isoproturon and fluroxypyr was reported excellent against complex weed flora.

Weed control treatments increased crude protein content in wheat grains over weedy check.

Wheat seed contaminated with weed seeds is a source of weed infestation in wheat and is of great concern.

Session 3

Weed Management in Rice

Chairman : Dr. L. S. Brar Co-chairman : Dr. Salik Ram

Rapporteur : Dr. N. T. Yaduraju

Out of 48 papers listed only 12 papers were presented in this session. The salient features are listed below :

Dr. R. P. Singh and S. K. Sharma of BHU, emphasised the importance of chemical weeding in upland rice mainly because of shortage of labour and wet soil conditions. The competitiveness of *Echinochloa crusgalli* in reducing the yield of upland rice was highlighted. They suggested combination of thiobencarb and 2, 4-D at 1.0+0.50 kg/ha for broad spectrum weed control and also emphasised the need of integrated weed management in upland rice.

Dr. Kurchania and K. K. Samaya of JNKVV, jabalpur also endorsed the view that manual weeding is not profitable in upland direct seeded rice. *Lehi* method-broadcasting sprouted seeds in puddle was better than direct seeding. Application of butachlor mixed with single superphosphate was although slightly inferior to spray appllcation but help reducing the application cost.

Dr. Gogoi of AAU, Jorhat presented 4 papers regarding weed problem in Assam in transplanted as well as direct seeded rice. A water weed *Fissendacarpa linifolia* in midtand conditions was found to be not controlled by any reconmended rice herbicide. They found that some tall growing varieties of rice give a good control of this weed. In another paper they observed good control of weeds in transplanted rice with butachlor application mixed with sand which was comparable with butachlor granular application or application through spray.

Dr. Chandrakar and Tripathi of Raipur (MP) recorded good control of many grassy weeds with the application of thiobencarb 1.5 kg/ha or anilofos 0.60 kg/ha. Applying 20-30% of N at sowing reduced weed competion. Avoid heavy application of N at sowing. In another paper Dr. Rao from Baptla, found that anilofos 50 E. C. compared well with hand weeding with respect to weed control potential.

Dr. Samar Singh from Hisar suggested use of thiobencarb at 0.60 kg/ha or anilofos at 0.10 kg/ha applied 3 or 6 days before sowing for weed control in rice nursery Dr. Salik Ram from CRRI, Cuttack, reported that three criss cross ploughing with manual weeding were beneficial for higher productivty of rice under direct seeded or transplanted conditions.

Work done at Annamalai University indicated that higher seed rate of 100 kg/ha in direct seeded rice can help reducing the dry matter of weeds.

Parbakara Setty working at RRS, Brahmavar, Karnataka found that application of thiobencarb 1.0 kg/ha 10 days after sowing proved more safe to the crop than its early application at 5 days after sowing to direct seeded rice.

In lowland rice, another approach given by Dr. Ganeshraja from Madurai (TN) indicate that summer ploughing once, followed by pre-emergence application of butachlor 1.5 kg/ha supplemented with one hand weeding 30 days after sowing recorded 64% higher grain yield of rice over unweeded check in upland rice.

Session 4

Weed Management in Oiiseeds and Pulses

Chairman : Dr. S. M. Kondap Co-chairman : Dr. H. S. Bisen

Rapporteur : Dr. M. Kaur

Out of 58 papers listed 23 were presented. In mustard, isoproturon applied post-emergeuce at 0.50 kg/ha or fluchloralin applied ppi at 1.0 kg/ha or two hand weeding given at 25 & 40 d.a.s. were comparable with weed free. In groundnut there was no interaction between varieties and herbicides. Fluchloralin at 0.84 or pendimethalin at 0.75 kg/ha gave similar yield as under two hand weeding (4 & 6 WAS). Work conducted at IGKVV Ambikapur (UP) indicated that line sowing of groundnut is better than broad-cast method. In this crop bullock drawn weeding implements were more efficient and

energy consuming. In sunflower pendimethalin, fluchloralin or metolachlor were found effective. In a persentation on weed management in gingelly (*Sesamum indicum*) dry matter yield following the treatment of allachlor+hand weeding or fluchloralin at 1.5 kg/ha were similar to weed free check. In sunflower the seed yield due to weed competion were 42 to 72% less than weed free treatments. It was concluded that metolachlor at 1.0 kg/ha followed by hand weeding at 30 d.a.s. was found effective in sunflower.

Dr. K. Narayan Rao from Baptala (AP) presented three papers on weed management in pulses. He concluded that : 1. Pendimethalin at 1.5 kg/ha was effective against *Cuscuta* in black gram, 2. Pendimethalin or fluchloralin at 1.0 kg/ha followed by one hand weeding were effective in soybean and 3. Fluzifop-p-butyl or sethoxydim at 0.2 or 0.3 kg/ha applied 15 d.a.s. provided effective control of *Echinochloa* Spp in green gram. In soybean and field pea presentation from N. W. Hills indicated that two or three hand weeding were superior than herbicides.

Isoproturon and pendimethalin were found to be effective for chickpea at Pantnagar condition. Isoproturon at 1.25 kg/ha was safe and more effective than 0.75 kg but yielded less than pendimethalin.

Work conducted at Jabalpur revealed that hand weeding was superior than isoproturon and pendimethalin in linseed.

At Hisar, integrated weed management in pigeonpea using fluchloralin at 1.0 kg/ha alongwith one hand weeding at 45 d.a.s. provided highest yield over other treatments. Pendimethalin alone was not satisfactory.

The oil quality and menthol content was unoffected with herbicides in Japanese mint at Pantnagar. Pendimethalin was better than fluchloralin.

In black gram, at Pantnagar, pendimethalin and fluchloralin applied ppi and hand weeding twice yielded at par with weed free treatments.

At Hisar chickpea cultivars C-235 and H-82-2 performed better than H-86-143 under different weed management system.

In soybean, presentation from N. R. C. Jabalpur highlighted the scope of flauzifpo-p-butyl for post emergence control of grassy weeds.

Presentation from Chhatisgarh (MP) showed that fluchloralin was effective against annual weeds in soybean. 30 cm. rowspacing and higher phosphate doses increased the weeds dry weight. Fluchloralin or pendimethalin were found superior for weed control in clusterbean also.

The chairman concluded that pendimethalin, fluchloralin, isoproturon, alachlor and flauzifop-p-butyl may be exploited with respect to dose, time and method of applIcation in oilseeds and pulses. He further pointed out herbicide applied at sowing and supplemented with one hoeing give higher benefit-cost ratio.

Session 5

Weed Management in Coarse Grain Crop and Intercopping Systems

Chairman : Dr. R. P. Singh Co-chirman : Dr. K. Narayan Rao

Rapporteur : Dr. R. S. Balyan

Five papers were presented in this session. Shahdev Singh from NRC. Jabalpur emphasised the possibility of using atrazine post-emergence in maize. Dr. J. Sharma from RRS Bajaura (HP) presented the data on weed management in maize+black gram intercropping system. He concluded that metolachlor or pendimethalin each at 1.0 kg/ha were safe and effectively controlled weeds in this system. Raj Singh while presenting paper on rice plus groundnut intercropping system in Meghalaya reported that two hand weedings (25 & 50 d.a.s.) were found most effestive and economical. The weed management in pigeonpea+sesamum intercropping system in Eastern Uttar Pradesh was found to be the most effective when fluchloralin was incorporated at 1.0 kg/ha. Presentation of work by Scientist from Rajendranagar (A. P.) in two intercropping system including groundnut+sunflower and turmeric+maize revealed that pendimethalin+one hand weeding were effective in groundnut+sunflower and fluchloralin+hand weeding or atrazine+hand weeding were effective in turmerie+maize,

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Session 6

Weed Management in Commercial and Fibre Crops

Chairman : Dr. S. P. Kurchania Co-chairman : Prof. R. H. Bhosle

Rapporteur : R. K. Bhatia

Five papers were presented in this session.

Dr. Brar from PAU, Ludhiana emphasised that atrazine at 1.0 kg, metribuzin at 1.4 kg or diuron at 1.6 kg/ha each applied pre-em. effectively controlled annual weeds and increased that cane yield by 108 to 120%

The same scientist reported that in cotton fluchloralin at 0.75 kg/ha applied ppi or pendimethalin at 0.75 kg/ha applied pre-eme and supplemented with one hoeing at 40 d.a-s. effectively controlled weeds.

Paper presented by Dr. Bhosle on nitrogen use economy through integrated weed management in rainfed cotton revealed that ppi application of fluchloralin at 0.90 kg/ha fb. interculture at 6 w.a.s. gave 3-4 times more cotton seed yield without nitrogen as compared to unweeded contrel with 80 kg N/ha.

Dr. Chauhan from Lucknow reported that atrazine applied pre-eme. at 2.0 kg/ha fb. 2, 4-D at 1.5 kg/ha effectively controlled the weeds and increased the cane yield by 29%.

Session 7

Weed Management in Vegetables and Horticultural Crops

Chairman : Dr. Govindra Singh Co-chairman : Dr. S. S. Tripathi
Rapporteur : Dr. R. S. Chauhan

Ten papers were presented. The Important findings emerged from deliberations are :

In potato isoproturon or pendimethalin applied pre-emergence were fouud effective. There was no consensus regarding time and method of application. Metribuzin and oxadiazond were also found promising in potato.

Pendimethalin or oxadiazon applied pre-eme were reported to be effective. One supplementary hoeing was necessary for season long weed control in onion.

In tomato, fluchloralin, metribuzin and pendimethalin were found safe and effective.

In brinjal, alachlor or pendimethalin applied pre-eme. and supplemented with one hoeing given at 30 d.a.s. were as effectlve as two manual weeding.

In fenugreek, methabenzthiazuron applied pre-eme. or fluchloralin applied ppi provided weed control comparable with weed free. Metribuzin was injurious to this crop.

Pendimethalin at 1.0 kg+oxyfluorfen at 0.15 kg/ha applied pre-emergence increased the bell pepper yield by 78% through efficient weed management.

In chicory, fluchloralin at 0.50 kg/ha controlled all weeds except *Phyllanthus niruri, Cynodon dactylon* and *Cyperus rotundus.*

Pendimethalin at 1.0-1.5 kg/ha provided effective control in garlic.

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Session 8

Perennial and Aquatic Weeds

Chairman : Dr. K. S. Sandhu Co-chairman : N. N. Angiras
Rapporteur : Dr. S. K Pahwa

Of the 12 papers listed, 8 were presented. Following recommendations emerged from the presentations :

At PAU, Ludhiana, frequent hot weather cultivation during May-June and raising quick growing crops during rainy season reduced the tubers population of *Cyperus rotundus*. Among herbicides 2, 4-D or glyphosate reduced shoot growth but not number of tillers.

At Palampur, 2, 4-D sodium salt+diesel oil (1:4) applied on freshly cut stems during July to September were effective against *Lantana camara*. Application of atrazine at 2.0 kg/ha after uprooting existing foliage or fluroxypyr at 0.25 kg/ha on regenerated foliage or glyphosate at 2.0 kg/ha on undisturbed foliage effectively controlled *Ageratum houstonianum*.

For the control of *Imperata cylindrica* it was felt that proper time of application of glyphosate, haloxyfopmethyl and dalapon may be worked out.

Presentation from HAU, Hisar emphasised the use of black or white polyethlene mulch against *Sorghum halepense*.

2, 4-D at 2.0 kg/ha+oil at 1.0 kg/ha effectively controlled *Parthenium hysterophorous* at Jabalpur.

2, 4-D or glyphosate application for control of water hyacinth altered the chloride, calcium, magnesium, potassium and sodium contents of the water body.

It was strougly felt that implications of herbicides use for aquatics ba thoroughly studied on crops, fish and cattle before a recommendation is given.

Session 9

Physilogical and Biochemical Aspects of Herbicides

Chairman : Dr. J. P. Tiwari Co-chairman : Dr. R. K. Bhatia

Rapporteur : Dr. Shahdev Singh

Six papers were presented in this session Mr. Khan from Faizabad reported that use of butachlor or thiobencarb reduced the fresh weight and nitrogen content of blue green algae. The application of herbicides should be delayed where blue green algae has been used as bio-fertiiiser. Other presentation from this station indicated that pendimethalin at 1.0 kg/ha supplemented with one hoeing increased the chlorophyll content in rice.

The leaf malforation in cotton due to use of 2, 4-D contaminated spray pumps adversely effected the fibre quality. The presentation from Hisar showed that polyethylene mulch improved the fibre quality.

Effect of environment and biotypes on the potency of isoproturon against *Phalaris minor* was studied at Hisar. A maximum temp. of 10°C and minimum 6°C was best correlated with efficiency of isoproturon. The isoproturon dose for killing Karnal Phalaris biotype was more than for other biotypes.

Session 10, 11, 12

Herbicide Mixtures, Herbicide Residues and New Herbicides

Chairman : Dr. V. M. Bhan Co-chairman : Dr. Geeta Kulshrestha

Rappoeteur : Dr. N. Yaduraju

Herbicide mixturee

The presentation from 4 papers indicated following trend :

Herbicide mixtures found useful were : Isoproturon at 1.0 kg/ha+2, 4-D at 0.75 kg/ha, isoproturon 0.75+2, 4-D 0.50 kg/ha, isoproturon+2, 4-D formulated by Gharda, isoproturon 0.75+fluroxypyr 0.15 kg/ha for wheat crop.

Mixture found not useful was of tralkoxydim+2, 4-D and the mixture requiring further confirmation is tralkoxydim+fluroxypyr.

Herbicide residues

9 papers were presented in herbicide residue aspects.

Butachior or thiobencarb applid in transplanted rice in Pantnagar did not effect succeeding crops like wheat, gram, peas and lentil.

Fluchloralin, pendimethalin and metolachlor did not leave any residue in post harvest soil of french bean.

No residue of isoproturon applied in wheat was detected at wheat harvest under Ludhiana condition.

The half life of pendimethalin under Delhi condition was 35 days in the flooded soil and 53 days in non flooded soil. The degradation of isoproturon in alluvial soil, black soil and foothill soil was 27, 32 and 37 days.

Atrazine got degraded to non detectable limits in 30 days in berseem plants 100 days in soil under Ludhiana conditions.

New herbicides

Out of 27 papers listed, 15 were presented

Mr. Samunder Singh while presenting 4 papers on new herbicides reported that tribenuron had no effect on wheat upto 20 g/ha but chickpea was sensitive to it. Of weeds, *Asphodelus*, *Anagallis Vicia*, and *Melilotus* were very sensitive but *Lathyrus* was little affected by tribenuron. Chlorimuron was toxic to raya, tomato, onion and chickpea but field pea was less affected. It was found very effective against *Polypogon monspelensis*, *Asphodelus* and *Melilotus*. *Phalaris*, *Avena* and *Lathyrus* were also susceptible to chlorimuron. Chlorimuron was more effective than metsulfuron against *Trianthema*, *Dactyloctenium*, *Echinochloa*, *Cyperus* and *Fiimbristylis*. *Asphodelus* was highly sensitive to bentazon but not to naproanilide or clopyralid. Similarly isoproturon was very effective against *Euphorbia dracunculoides* but naproanilide, bentazone or clopyralid were less effective.

Other work from Hisar indicated that trifluralin at 1 5 kg/ha provided good control of barnyard grass and carpet weed where as chlorimuron at 12g/ha provided excellent control of carpet weed in soybean. Dr. Sandhu from Ludhiana and Dr. Balyan from Hisar were of the view that clopyralid (100 to 250g/ha) provided good control of Canada thistle in wheat. Anilofos 50 or 30 EC formulation provided effective weed control in rice. Dr. Govindra Singh from Pantnagar and Dr. Angiras from Palampur reported the usefulness of imazethapyr in soybean. Haloxyfop methyl and flauzifop-p-butyl applied 15 or 28 d.a.s. provided excellent control of grassy weeds in soybean.