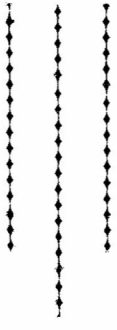
Indian Society of Weed Science

Abstract of Papers



MARATHWADA AGRICULTURAL UNIVERSITY
PARBHANI

431402.

MAU Welcomes You.

Programme of the Annual Weed Science Conference.

MARATHWADA AGRICULTURAL UNIVERSITY
PARBHANI.

Dated 29-1-1979

8-00 to 9-30 hrs	–	Registration
9-30 to 10-00 hrs	–	Inauguration of the Weed Exhibition.
10-00 to 11-40 hrs	–	Inaugural function
11-40 to 12-00 hrs	–	Tea break
12-00 to 13-30 hrs	SESSION I	(in auditorium)
		Papers on general nature
		Chairman : Dr. K. Krishnamurthy
		Rapporteur : Dr. Maiku Lal
		,, : Dr. S. V. Raikhelkar
13-30 to 15-00 hrs		Lunch
15-00 to 17-30 hrs	SESSION II	(in auditorium)
(Tea break)		Papers on Weed Control
(16-00 to 16-30) hrs		in Wheat, Peas, Mash, Mung etc.
		Chairman : Dr. A. K. Ghosh
		Rapporteur : Dr. B. B Singh
		,, : Dr D N. Borulkar
	SESSION III	(in Conference hall)
		Papers on Weed Control on Rice
		Chairman : Dr S. K. Mukhopadhyay
		Rapporteur : Dr. K. C Gautam
		,, : Dr. R. P. Rodge
17-30 to 18-30 hrs		Visit to Information Centre of M. A. U. Parbhani
19-00 to 20-00 hrs		Entertainment programme (in auditorium)
21-00 hrs		Dinner

Deted 30-1-1979

8-00 to 10-00 hrs		Visit to MAU Campus
10-00 to 10 30 hrs		Tea break
10-30 to 13-00 hrs	SESSION IV (in auditorium)	
		Papers on Weed Control in Sourghum, Pueses, Maize, Bajra etc.
		Chairman : Dr. K. R. Pawar Rapporetur : Dr. M. M. Hosmani ,, : Dr V. B. Shelke
	SESSION V (in Conference Hall)	
		Papers on Weed Control in Suger cane, tea, Banana, Potato, Tomato, Onion, Vegetable Crops.
		Chairman : Dr. David N. Sen Rapporteur : Dr. S. Sankaran ,. : Dr J. T. Nankar
13-00 to 14-30 hrs		Lunch
14-30 to 16-00 hrs	SESSION VI (in auditorium)	
		Papers on Weed Control in Cotton Jute, acquatic weeds, and Groundnut
		Chairman : Dr. J. C Mujumdar Rapporteur : Dr. G. K. Patro ,, : Dr. N. T Sarnaik.
16-00 to 16-30 hrs		Tea break
16-30 to 17-30 hrs		General Body meeting of the I S W S (in auditorium)
17-30 to 18-00 hrs		Valediectory function
19-00 to 20-30 his		Entertainment programme
21-00 hrs		Dinner

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Papers on general Weed Control

INTEGRATED WEED CONTROL, PLANNING AND PROSPECTS

R. K. Malik
Haryana Agricultural University

"An integrated weed control is a economical arrangement of all appropriate weed cor trol techniques to fit in the individual problem in order to achieve optimum weed control with a minimum of crop and environmental hazards" Weed control must be viewed as full course of crop production. Only those elements of good management, mechanical, biological, chemical methods are used that are most appropriate and which when taken together give the best results.

An integrated weed control plan and system must be individual, practical, sound and flexible Individual is necessary because problems differ with soils, crops, environment and financial availability. The system should be practical, so that it can be applied and economically sound and flexible so that it can be continuously used as the problems, weather, financial change, new herbicide and equipment become available.

ICRISAT's APPROACHES TO INTEGRATED WEED MANAGEMENT RESEARCH

S. V. R. Shetty, Agronomist
International Crops Research Institute for the Semi-Arid Tropics, Hyderabad

The overall objective of the weed management research at ICRISAT is to develop effective, economically feasible, alternate, improved weed management systems for major crops and cropping systems of the semi-arid tropics (SAT). Initially emphasis was focussed on SAT weed survey, weed management field research, herbicide screening and weed ecology studies. It was intended to identify poss ble inputs like cultural, mechanical, biological and chemical and consider the relative feasibility of these approaches in the small farmer situations Research on complete systems takes into consideration the crop-crop and crop-weed interactions The two approaches so for considered were (1) manipulation of croppIng system to obtain better management of weeds and (2) identify effective management systems. Herbicide related

studies are mainly aimed at the possible use of chemicals for increasing productivity rather then for reducing the cost of hand weeding The research on individual crops is mainly confined to determine the extent of crop-weed competition in ICRISAT major crops. Recently in collaboration with economists operational research in the farmer's fields were initiated to observe the success of farmer's own methods in overcoming weed competition in the existing farming systems. At the main center the primary emphasis, would be to evaluate the principles of weed management which may have wide applicability throughout the SAT. It is believed that the individual components of the "Integrated System" should be looked in greater detail in an effort to develop effective measures of weed management.

INTEGRATED WEED MANAGEMENT

V. C. Reddy and K Krishnamurthy,
G. K V. K. Champus, U A. S., Bangalore—65.

Employing more than one method for weed control will provide good control of weeds over a long period of time. This in other words amounts to an integrated approach. In this direction, effectiveness of prevention, physical/mechanical, crop husbandry, biological methods in controlling weeds have been indicated.

Use of weed-free crop seeds prevents spread of canary grass (*Phalaris minor*) and wild oats (*Avena fatua*) into wheat field. Use of contaminated farm yard manure (FYM) with weed seeds to the crop should be basically avoided. Treatment of weed seed contaminated FYM with ammonia thiocyanate, uramon or metham etc. help in killing weed seeds and thus further spread. Further, taking all precautions to prevent entry of weeds to farm lands and quarantine restrictions on weed seeds also constitutes other methods of weed prevention.

Crop husbandry practices like crop stimulation (by supplying fertilisers only to crop), plough-planting (sowing crop seeds in furrows behind plough), planting time (early sowing of cotton, maize in *kharif* and late sowing of dwarf wheats in winter), planting pattern (square type of planting than rectangular for sorghum), plant population (even and dense population creates thick shading which supresses weed emergence and growth) and crop rotation (wheat with peas, lucerne with grains, sorghum with cotton, groundnut, eliminates wild oats, striga and orobanche, respectively) have been

recommended. Incorporation of FYM to the field in the first ploughing and taking up subsequent ploughings after weeds germinate will help in redution of weeds. Growing of smother crops like fooder sorghun, cowpea and pearl millet help in minimising the weed problem.

Irrigating the fields before sowing to induce weed seeds to germinate, application of chemicals like ethylene which induce weed seeds to germinate and such practices followed by harrowing will go a long way in minimising weeds. Frequent deep cultivations help controlling nutsedge, striga and other parennial weeds Combinations of inter-cultivation and herbicide application has proved effective in weed control besides reduce the costs in sugarcane, sugarbeets, maize and cotton production.

Insect bio-agents, have been successful in controlling Lantana, Opuntia St. Johns' Wort and Alligator weed Several bioagents which hold promise deserves to be tested further.

It is time that under a given sytem of farming several combination of integrated weed control are compared to pick out the best, economical and practical one. In addition to following the integrated weed control methods under the prasent condition, development of ways and means for utilisation of of weeds (as feeds, manure, for paper and pulp, energy and for treating sewage) is a better perspective for developing contries.

INTEGRATED WEED CONTROL IN FIELD CROPS OF TAMIL NADU

R. Kulandaivelu and Y. B. Morachan
Tamil Nadu Agri University, Coimbatore-641003.

Evaluation of herbicides for weed control in major field crops of Tamil Nadu has been carried out for the past one decade in Tamil Nadu Agricultural University. The results of these experiments indicated the need for integrated weed control approach in field crops due to change in farming systems.

The field crops require a weed free condltion for 6 to 8 weeks at the initial period of crop growth To achieve this objective, we recommend a pre-emergence herbicide which will keep the field free of weeds for a maximum period of three weeks followed by one late hand weeding. The present sysrems of farming do not permit the use of a herbicide which is highly persistant in the soil and which may affect the succeeding crops. Hence the future

research on weed management will be on integrated weed control using herbicides coupled with agronomic practices like inter cropping in sorghum, water management in rice, mulching in cotton and burning of trash in Sugarcane etc , to evolve a suitable and economical method of weed control apart from Crop rotation, intensive cropping and field sanitation.

WEED CONTROL BY CULTURAL PRACTICES

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Department of Agronomy, USA, Dharwad-8

Control of weeds by cultural methods is practiced from time immemorial. Systematic studies conducted in this direction have revealed that effective control of annual and parasitic weeds could be achieved by these methods. Effect of previous crop on weed emergence has revealed that both grasses and broad leaved weeds emerged were higher in plots where sorghum was grown previously without much care as compared to cotton, tobacco or chilli Repeated harrowings had resulted in very less weed population as compared to wooden ploughing or tractor ploughing. Deep ploughing the land before planting had reduced the incidence of *Striga* by burying the seeds deep into soil. Crop rotation with cotton or groundnut has reduced the *Striga* menace as compared to growing of jowar every year. Cotton and groundnut also stimiulate the parasite to germinate but does not get themselves, parasitised. Flooding the soil to a depth of 5 cm will reduce the emergence of weeds to a great extent. *Striga* incidence was low in heavily irrigated plots as compared to light irrigated plots, and the incidence was low in a season when rainfall distribution was uniform and high as compared to drought years.

Wider spacing was found to reduce the weed population as compared to narrow spacing. Application of nitrogenous fertilizers have reduced tho occurrence of *Striga* as compared to control treatment Application of herbicides can be very well manipulated along with hoeing. Studies made with entire and band placement of atrazine on sorghum with and without hoeing have revealed that there was a possibility of saving half the herbicide quantity when applied as band with hoeing treatment. Studies made on all these aspaects are discussed at length in this paper

STUDIES ON THE SPROUTING BEHAVIOUR OF *CYPERUS ROTUNDUS* L TUBERS.

S. N. Verma and R. K. Sharma
K. A. P. G. College, Allahabad.

An experiment was conducted to study the effect of some herbicides on the sprouting of nutsedge (*Cyperus rotundus* L) tubers. It was found that ROUNDUP (Glyphosate) supressed the sprouting of tubers. However, the percentage decreased wlth the increase in the concentration of all the herbicides used up in the experiment.

CONTROL OF CYNODON DACTYLON

C. B. Kurdikeri, T. K. Prabhakar Shetty, M. M. Hosamani
Agricultural College, Dharwad.

Cynodon dactylon (Pers.) [Hariyali] is a hard pernicious, ubiquitous, aggressive and invasive weed most commonly found in tropical, sub-tropical and semi - arid regions. Once established, it expands uninhibited causing severe losses in yield and quality of crop plants by way of (1) depletion of nutrients (Singh and Singh 1939), moisture, (Kanitkar *et al.*, 1960), aeration, light, space, (2) acts as alternate and collateral hosts of many pests, (Maxwell *et al*, 1972), diseases (Kulkarni *et al*, 1973) and parasite weeds, (3) release biologically active phytotoxic substances (King, 1974). Eradication of this noxious weed either by manual, mechanical, chemical and biological means has been found difficult, costly and inefficient. It is therefore rightly considered as one of the worlds worst ten weeds by Holms (1969).

In this paper efforts are made to review the efficient ways and means of eradication of this weeds stressing much on integrated approach for control.

A SURVEY OF THE WEED FLORA OF KADANA PROJECT COMMAND AREA OF KAIRA DISTRICT IN GUJARAT STATE

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Gujarat Agricultural University, Ahmedbad.
B. A. College of Agriculture, Gujrat Agricultural University, Anand Campus, Anand.

A systematic investigation of the extent and magnitude of prevalence of different weed flora as various environmental factors regulate their distribution, competitive ability and intricate inter - relationship are pre - requisites for any attemp directed towards weed control programme.

With this view in mind a study of weed flora was made of the farm land, waste land, irrigation canals and area of the Kadana Project Command Area of the Kaira district in the year 1977-78 The soils of this tract are sandy loam to black. The average rainfall of the tract is 862 mm with fairly cold and dry winters and hot summers.

In all fourty nine families with about one hundred seventy weed species were observed during the investigation. The investigation was also extended to irrigation canals and channels. About ten weed species were observed in irrigation Channels and canals. The area covered by these water weeds was also considerable in irrigation command area of Kadana Project. The common local names for different weeds were also investigated during the the survey work.

INTERGRATED CONTROL OF *PARTHENIUM HYSTEROPHORUS* L. AT PARBHANI.

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Marathwada Agril. University, Parbhani.

Parthenium hysterophorus L., commonly known as " Gajar Gavat ", "pandhari Phule", "Chatak chandani" or "carrot Grass" is a native of Central and South America and West Indies It was introduced along with milo into India and was first noticed in 1956 at Poona. This has now spread to different parts of India and become a serious weed.

Interdisciplinery experiments conducted at Marathwada Agricultural University, Parbhani have helped to develop a strategy to control this weed. Indigenous insects found on this weed are of little control value besides these were found to be harmful pests of cultivated crops. The only possibility seems to be to introduce highly specific natural enemies of *parthenium* from its native home. Since biological control are long term measures, requiring several years to develop, interim control measures like mechanical and chemical methods are recommended.

This weed can be easily controlled by mechanically and manually, preferably before flowering stage during the rainy season. It is desirable to wear gloves or polythene bags on hands before the weeds are pulled as a safety measure against any posible skin ailment. Spraying 2, 4-D@ 1-1.5 litres a. i. per hectare before flowering stage is recommended in the cultivated field. In the dicot crops this weed should be removed by hand pulling only. In the non-aerable areas i e. on the road & track side and waste lands common salt (7 to 10%) per hectare is recommended.

THE PROSPECTS OF USING INDIGENOUS AND EXOTIC NATURAL ENEMIES IN CONTROLLING PARTHENIUM WEED

A. K. Raodeo and D. S. Tayade
Department of Entomology, MAU, Parbhani.

Parthenium hysterophorus L., commonly known as carrot grass is a native of central and south America and West Indies. This weed was accidentally introduced into India possibly from U. S. A., two decades ago. In India it was first noticed in Poona and from there it has now spread like wild fire in other parts of Maharashtra, Karnataka, Madhya pradesh, Andhra Pradesh, Tamil Nadu, Delhi and Jammu and is moving fast and far in the plains and hills.

In India *Parthenium* is attacked by various native insects The survey undertaken by the Department of Entomology, Marathwada Agricultural University, Parhhani. has revealed that this weed is infested by many insects, prominently by *Heliothis armigera*, Grass hopper, *Orthacris eimulans* and aphids, *Aphis gossypii* G. Pot trials conducted, revealed their feeding habits on this weed. However, these insects are of little control value. They are themselves harmful pests of the cultivated plants Hence. there are no chances of utilising indigenous bioagents against the *Parthenium* weed. The only possibility seems to be to introduce highly specific natural enemies of this weed from its native home Preliminary surveys in Argintina and Trinidad have shown

that a few insects attack this weed. Besides, a number of arthropods severely infesting *P. argentatum* commonly known as Guayle from U. S. and Mexico could also be tried as bioagents against this weed.

COMPARATIVE EFFECTIVENESS AND ECONOMICS OF MECHANICAL AND CHEMICAL METHODS OF CONTROL OF *PARTHENIUM HYSTEROPHORUS* LINN.

T. V Muniyappa, T. V. Ramachandra Prasad and K. Krishnamurthy,
University of Agricultural Sciences, Bangalore.

Two separate studies involving selected pre-emergent herbicides, post-emergent herbicides and mechanical control of *Parthenium* at blooming stage were made during late *Kharif* 1977 with a view to know the comparative effectiveness and economics of different control methods. Among the post-emergent herbicides, diquat (1 . 0 kg/ha) caused cent per cent mortality of the weed by 15 th day itself, while other herbicides like MSMA (2 . 61 kg/ha), glyphosate (0 . 9 kg/ha), 2,4-D sodium salt (6 . 0 kg/ha), 2,4-D amine salt (5 . 4 kg/ha), dicamba (2 . 05 kg/ha) and picloram (1 61 kg/ha), caused 98 to 100 per cent mortality by 45 th day after spraying. 2,4-D compounds were slightly slower in causing mortality of the weed. All herbicides reduced dry weight of the weed considerably. The fresh weed emergence count made upto 90 days after complete mortality of the weed indicated that picloram had the least weed count (1/su. m). followed by dicamba (7) and 2,4-D compounds (22 to 24). While it was pretty higher in MSMA, glyphosate and diqu at (254 to 362/sq. m.) as against 676 in control water sprayed plots). Cutting the weed to the ground level was ineffective and caused only 20 per cent mortality. Uprooting of the weed did not result in regrowth of the weed and there were innumerable fresh sprouts. Among the pre-emergent herbicides, atrazine (1 . 25 to 1 . 4 kg/ha), terbutryne (6 . 0 kg/ha) and RH 8817 (coded product) (2 . 8 to 5 . 8 lit/ha of commereial formulation) were most effective in preventing the weed emergence upto 150 days after spraying, followed by 2,4-D amine salt (2 . 8 to 5 . 0 kg/ha) and 2 4-D Na salt (2 . 8 to 4 . 0 kg/ha). 2,4-D slow release (1 4 to 2 . 8 kg/ha) was not so effective as compared to other 2,4-D compounds. However, this needs confirmation.

Based on the economic analysis of selected treatments indicated that herbicides were cheaper (Rs 168 to 413/ha) than cutting or hand pulling (Rs. 600 to 700/ha). Among the herbicides, atrazine (as pre-emergent) was the cheapest. The next best was 2,4-D Na salt. The cost of MSMA diquat and 2,4-D amine salt were moderately higher. The harbicides were

more effective and eoconomical than mechanical methods The study indicated utilily of pre-and post-emergent herbicides application in succession for better control of the weed to a reasonable period of time.

PROBABLE USE OF PHYLLODY DISEASE PATHOGEN AS BIO-CONTROL AGENT IN CONTROLLING PARTHENIUM WEED

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The survey in different localities of Marathwada region for appraising the natural incidence of phyllody disease is reported, The disease was found spreading in nature. The nature of the agent causing phyllody disease is identified as mycoplasmlike organism (MLO) on the basis of transmission studies and antibiotic therapy. The host range of phyllody disease is also reported. The pathogen did not infect sesamum as has been reported elsewhere or any other test host. Since phyllody disease leads the plants to complete sterility at an early infection, the use of phyllody MLO as indigenous biocontrol agent in controlling parthenium weed is suggested.

PARTHENIUM THE PROBLEMATIC WEED

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Parthenium (*Parthenium hysterephorus* Linn.) has been an introduced weed to our country and was first observed in Pune during 1966. During these years, it has spread almost throughout the country and in some localities in alraming proportion. The plant keeps flowering and seeding round the year and has been continuously spreading to newer areas, It is a common sight to see this all along the roads and railway tracks, having spread through the moving traffic and other modes of dispersal. It has now entered agricultural fields also Having spread over urban areas it has now reached rural areas also. Several health hazards due to this weed have already been recorded. In addition to this, its presence in agricultural fields is posing problem on agricultural productivity. It should be noted that it is prevalent to a greater extent in non-agricultural areas. Every effort should be made through a coordinated approach to eradicate this undesirable weed systematically.

Considerable work on cultural and chemical method for its control has gone on. Besides, it should be noted that considering its hazards, the Karnataka Government during 1975, has covered this weed under the Karnataka Agricultural Pests and Disease Act of 1969 It is highly desired that every State takes steps to cover this weed under the Act and effort towards eliminating this weed from our surroundings.

ROLE OF PARAQUAT IN THE INTEGRATED WEED MANAGEMENT UNDER INDIAN CONDITIONS

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The Alkali and Chemical Corporation of India Limited, Bangalore

Integrated weed management will involve a thorough study of farming systems in India. Weed mangement should take into account the use of all methods of weed control viz., manual, mechanical, cultural and chemical.

To improve acceptance of herbicides as a part of weed management, properties of herbicides and suitable machinery to improve economy of use should be fully exploited.

Paraquat a versatile contact action herbicide was selected for studying optimisation of its effects in combination with polythene mulch, wetters and extra small swathe nozzles.

In two trials conducted at the ACCI's Agro-Chemicals Screening Station, Bangalore, use of black polythene mulch for 2 to 4 hours following application of paraquat improved the resulting weed control.

Extra narrow swathe nozzles were used for inter row application of paraquat in row crops like cotton, bhendi, brinjal and jowar. Effective weed control and economic use of paraquat was achieved by using nozzies spraying a swathe of 38 cm or 42 cm.

FEASIBILITY OF CHEMICAL WEED CONTROL IN MULTIPAL FORAGE CROPPING SYSTEM OF BAJRA (P. TYPHOIDES) -- COWPEA (V. SINENSIS) -- OAT + PEAS (A. SATIVA + P. SATIVUM).

R. K. Pandey, Fateh Singh and S. D. Gupta
Indian grassland and Fodder Research Institute. Jhansi.

The experiment was conducted on medium soil at I. G. F. R. I,, Jhansi from 1976-78. All combinations of pre-emergence atrazine at 0.5 kg / ha in bajra (rainfed) and pre-planting trifluralin at 0.5 kg / ha in cowpea (rainfed) and pre-emergence Linuron 0.5 kg/ha in oat + peas (irrigated) with their respective weedy checks were studied in four time replicated randomised block design. Treatments of atrazine and linuron reduced the intensity of annual weeds effectively in their respetive crops and promoted drymatter yield of bajra in first year and oat + peas in second year significantly over weedy check. Non-significant response of weed control treatments showing merely the increasing trend in the yield of these crops might be attributed to the less weed infestation. The intermediate crop of cowpea did not suffer from weed infestation as such no utility of trifluralin tretment was recorded Chemical treatment applied in either one of the crops or first two or last two or first and third or all three crops of tha system appeared nonharmful for crop production. In order to avoid plant mortality in oat, first irrigation was required to be given after three-weeks of the sowing.

ENHANCEMENT OF GLYPHOSATE ACTIVITY BY SOLUBILIZATION AND FERTILIZER ADDITIVES

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Pot and field experiments were conducted to study the possibility of enhancing the herbicidal activity of glyphosate (*N*-(phosphonomethyl) glycine) by converting into solubilized from and by tank mixing fertilizer additives. In solubilization studies, glyphosate (41% a. i.) was mixed with a solubilized oil formulation to obtain solubilized glyphosate (4 . 1% a. i.) and its effect was studied At 0 . 4 kg/ha, the solubilized glyphosate showed substantially higher activity on *Imperata cylindrica* (thacthgrass), a commonly occurring perennial

grass weed in tea, than that of the normal glyphosete formulation; weed control efficacy at this rate was similar to that of the latter at 0 8 kg/ha. These results indicated that solubilization enhances the weed control efficacy of glyphosate and helps to reduce its optimum rate of application substantially.

In separate experiments, ammonium sulphate, urea, super phosphate (single) and diammonium hydrogen phosphate were tank mixed at 0 . 5% and 1% with glyphosate (0 . 4 kg ha) solution. Addition of ammonium sulphate and diammonium hydrogen phosphate increased the activity of glyphosate on *Imperata*. Better weed control was observed when they were mixed at 5 . 0%. These results suggest that the ammonium salt present in these two fertilizers is probably contributing to this enhanced glyphosate activity by way of its effect on membrane permeability.

STIMULATION AND INHIBITION OF WEED SEED GERMINATION

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Weeds are more competitive and aggressive than crop plants in many aspects. Weed seed population in the soil may vary upto 865 million per ha. Nonchemical methods of weed control may offer alternative to pesticide which persist in the enivronment. If dormant weed seeds in the soil could be stimulated to germinate and then killed with tillage or herbicides, it might be possible to deplete the weed seed reserve in the soil. Several hormones are known to stimulate the germination of weed seeds. Ethylene ($C_2 H_4$) gas is the only germination stimulant used commercially, Ultra high frequency electromagnetic field and sodium azide are also tried with success in control of weeds Simulation of parasitic weed seeds viz , *Striga, Orobanche* to germinate in the absence of a host by ethylene is now practically employed in the destruction of these weeds, Studies made on ethylene revealed that it diffused greater than 120 cm, horizontally from the point of injection and more than 90 cm. below the soil surface. Rates of 0 . 42 kg per ha. induced germination of witch weed seeds in sandy soil but 1 . 1 kg. per ha. was required on a heavy clay soil.

Agricultural use of azides has met with varying success. Potassium azide (KN_3) and sodium azide (NaN_3) are used for stimulation of dormant weed seeds A six hour imbibition in sodium azied stimulated neraly 100 per

cent germination of dormant wildoat seeds in petri-dishes. Disc incorporated sodium azids at 11 . 2 kg/ha caused 4 fold increase in wild oat emergence UHF fields are known to produce both thermal and non thermal effects on biological material. Pre-emergence tes + s in fields indicated that energy level above 70 J per cm^2 were required for consistent control. Post emergence tests indicated that broad leaved weeds are more susceptible than grasses.

EFFECT OF HERBICIDES ON THE SPROUTING OF BULBS OF *OXALIS LATIFOLIA* H. B. AND K.

L. P. Misra, D. P. Sharma anc H. S. Dhuria
Regional Fruit Research Station. Mashobra, Simla - 171007. (H. P.)

Twelve herdicides were tested for their killing capacity of *Oxalis latifolia* H. B. and K-bulbs under laboratory conditions. Pre-soaking with herbicides dichlorprop, MSMA, butachlor, fluchloralin, 2, 4, 5-TP and paraquat completely killed the bulbs Atrazine and terbutryne did not effect the sprouting of bulds. Butachlor (500 and 1000 ppm) did not kill the bubls but inhibited their sprouting even up to 42 days after treatment.

RELATIVE TOXICITY OF S-TRIAZINES TO CERTAIN "RABI" CROPS

Mrs. Gita Kulshrestha, N. T. Yaduraju and V. S Mani

Triazines like atrazine and simazine are often used to selectively control weeds in crop like maize, sorghum, pearl millet, sugarcane etc Since most of these crops are grown in kharif season, a knowledge regarding the persistence effect of these two on rabi crops is essential. A bioassay study was therefore, made to assess the relative toxicity of simazine and atrazine on gram, peas, lentil, wheat, oats, barley and mustard Mustard was found highly sensitive while gram and peas were less sensitive. Lentil, barley and wheat were intermediate as indicated by the ED 50 values (the conc. of herbicide in ppm wherein the dry weight of the test plant was reduced by 50% of the contol). The ED 50 values are under :

Test soecies	Simazine	Atrazine
Gram	0 . 31	0 . 74
Peas	0 . 33	0 . 33
Lentil	0 . 25	0 . 15
Wheat	0 . 31	0 . 15
Oats	0 . 06	0 . 03
Barley	—	0 . 07
Mustard	0 . 02	0 . 008

RESIDUAL TOXICITY OF HERBICIDES IN THE FIELD CROPS OF TAMIL NADU

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Farmers Training Centre. TNAU, Coimbatore.
Kumaraperumal Farm Science Centre, TNAU, Tiruchi-9.

The herbicide residue with relation to the crops following the herbicide application is important in terms of crop production. The most common method of assessing soil residue is bioassay with suitable test crops due to their relative simplicity, versatility and the most realistic relationship with test crops for which the tests are being carried out Following the final harvest of the main crop, the field plots were ploughed, harrowed and relaid with the aid of identification marka on the borders made before ploughing the area. The clods were broken, plots were levelled and optimum soil condition was ensured. There were twelve test crops for field studies namely Sorghum (Co . 18), maize (Deccan Hybrid) green gram (Co . 2), black gram (Co . 2), Cotton (MCU . 5), Okra (Pusa Sawani), sunflower (EC 68413), mustard (local var), amarantus (Co . 2), fox tail millet (Co . 2), pearl millet (HB . 3) and finger millet (Co . 7). Soil samples from two depths of 0-15 cm and 15-30 cm were collected at the rate of three samples/plot and taken into a quarter sized mud post. Five small seeded test crops namely mustard (local), amaranthus (Co . 2), fox tail millet (Co 2). pearl millet (HB . 3) and finger millet (Co . 7) were included Seeds of test crops numbering 25 were sown in lines on the soil at a depth of about 1 . 25 cm and covered with soil.

Germination of large seeded test crops under field condition and small seeded test crops under pot culture condition were evaluated. Dry matter production of test crops were estimated only under field conditions.

The germination of test crops under field condition were not influnced due to residual toxicity except okra. In okra the germination was significently affected in treatments receiving metribuzin at 1 . 0 kg/ha (54 . 4 per cent) and metribuzin 1 . 0 kg plus one hand weeding (54,8 per cent). Among the small seeded test crops no difference in germination was noticed in the soil samples collected from 0-15 cm and 15-30 cm. Alachlor was applied by pre-emergence technique 120 days prior to sowing of test crops. The interval between application of metribuzin and sowing was 108 days. With reference to mean plant height of test crops, there was a trend of increased plant height in treatments without herbicides, alachlor and lower doses of metrihuzin. The dry weights of all the test crops were not affected probably due to very low level of herbicides residue left over were below the phytotoxic level of these test crops. Metribuzin at 1 . 0 kg/ha. though influenced the germination of okra, failed to influence the dry weight after 30 days. It is attributed to further loss of herbicidal effect through degradation leaching etc , in the soil.

LOSSES CAUSED BY WEEDS IN CROPS OF ANDHRA PRADESH

Dr. D. J. Chandra Singh and K. M. Gupta
APAU, Agricultural College, Bapatla.

Weeds are accepted and established enemis for crop production. Their incidence is almost constant and unavoidable. Inspite of its surmounting losses the impact of weed science is not felt in accordance with its damage. The paper presents data collected from different statistically laid out trails indicating the losses in yield caused by weeds in different crops. This is only one aspect of the losses which is of the primary importance.

The losses duo to weeds in different crops is presented in the following table.

Sr. No.	Crop	Per cent of loss in yield due to weeds
1	Rice	4 . 72 to 65 . 13
2	Sugarcane	10 . 18 to 36 . 71
3	Groundnut	22 . 00 to 75 . 00

4	Cotton	24 . 00 to 75 . 00
5	Jowar	12 . 00 to 73 . 00
6	Ragi	11 . 00 to 56 . 00
7	Maize	5 . 00 to 34 . 00

ALLELOPATHIC INFLUENCES OF *CUCUMIS CASLOSUS* COGN., IN INDIAN ARID ZONE

R. P. Bansal and David N. Sen
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The association of *Cucumis callosus* showed harmful effects on bajra (*Pennisetum typhoides S & H*) and til (*Sesamum indicum*) crops. Growth and yield of crop plants were decreased. A decrease of 45 . 0 and 62 . 0 percent in yield of bajra and til respectively were observed. Chlorophyll and carotenoid pigments also decreased. The leaching effect from the buried biomass was harmful to both crops. A decrease in yield of 69 . 0 and 14 . 7 percent was observed in bajra and til, respectivejy growing in plots having buried biomass of *C. callosus*. The pulp extract of the fruit contained both inhibitory and promotory substances. Seed germination was inhibited in higher concentrations of the fruit extract in bajra and til. 10 percent fruit extract caused an increase of hypocotyl in both the cases. The growth of radicle and hypocotyl of til was inhibited severely in acetone. ethanol, methanol and water in successive extractions of *C. callosus* fruit pulp. In separate extractions, maximum inhibition of radicle growth was observed in methanol, followed successively by ethanol, acetone and water fractions and inhibition in hypocotyl growth was observed in methanol, followed successively in acetone, ethanol, benzene and petroleum ether fractions

CHEMICAL WEED CONTROL IN CASTOR

S. Narsa Reddy, S. M. Kondap and Bucha Reddy

In a field trial conducted at Agricultural College Farm, Rajendranagar dnring Kharif season of 1972, using five herbicides with two concentrations of each alongwith hand weeding and no weeding treatments, Lasso was found

to be superior that all other herbicides. Lasso @ 6 L/ha and 8 L/ha concentration has resulted in better control of weed, higher uptake of NPK by the crop and maximum seed yield of castor which were comparable with hand weeding treatment. TOK, WP 50% was fhe next best herbicide particularly at higher concentration (10kg/ha) which also controlled weeds effectively and gave higher yields of castor. Ansar - 529 which was used as post - emergence herbicide proved in effective in controlling the weeds. Ronstar and Dosanex at both concentrations had toxic effect on crop which resulted in mortality of castor plants.

Lasso @ 6 lit/ha can be recommended in caster for sandy loam soils.

SESSION - II

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Papers on Weed Control

in

Peas, Wheat, Mung and Mash crops

STUDIES ON THE EFFICIENCY OF DIFFERENT WEED CONTROL METHODS WITH VARYING PLANT SPACINGS IN WHEAT

G. K. Patro, G. C. Tosh and K. M. Mallick
All India Co-ordinated Agronomic Research Project, and Gramya Bank, Pipili.

The relative efficiency of Tribunil (Methabenzothiazuron) Dosanex (Metoxuron), Basalin (Fluchloralin) and Sirmate (Dichloromate) was tested on the test crop of wheat (UP 262) at Bhubaneswar during 1977-78 (winter). They were tried as pre-emergence sprays mixing in 1000 litres of water/ha. Tribunil and Sirmate were tried @ 2 . 0 kg a . i/na while Dosanex and Basalin were tried @ 1 . 0 kg a . i/ha. The weed free control and unweeded control treatments were maintained for comparison. These weed control treatments were tried with three varing spacings of 15 cm, 20 cm and 25 cm. The results obtained there from are as uuder.

A) Weed studies . Amongst the herbicides tried, Tribunil application was found to be most promising in respect of control of weed population and dry matter accumulation of weeds. This was closely followed by Basalin and Dosanex. Sirmate was found to be inferior in respect of weed control amongst the herbicides tried. Weed Free Control' recorded minimum weed growth due to frequent interculture.

B) Crop studies and yield : None of the herbicides showed any deliterious effects on crop germination. The weed free control treatment recorded the maxlmum grain yield. But amongst the herbicidel treatments, Tribunil was the best. The grain yields were higher with wider spacings.

STUDIES ON WEED MANAGEMENT IN GROUNDNUT AND THE RESIDUAL EFFECTS OF HERBICIDES ON SOIL PROPERTIES AND SUCCEEDING CROP OF WHEAT.

Biradar S. C. and Patil B. R.

The field experiment was carried out during 1976-77 at Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist A'nagar (Maharashtra) to test the effect of pre-emergence applications of Tok E-25, fluorodi fen and trifluralin on weeds, their selectivity to groundnut and the residual effects of the herbicide treatm-

ents on subsequent crop of wheat, The soil was clayey, medium in nitrogen and high in available phosphorum and potash. The pre-emergence applications of fulorodifen at the rate of 3 kg per hectare or trifluralin 0.50 kgs per ha., respectively controlled almost all the weeds and appl cation of fluorodifen gave maximum pod yield. There was no residual toxic effects on wheat when Tok-E-25, trifruralin or fluorodifen were applied as pre-emergence soil sprays.

CHEMICAL WEED CONTROL IN WHEAT WITH SPECIAL REFERENCE TO PHALARIS MINOR

K. S. Rathi and A. N. Tewari
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A field experiment was conducted for two years (1976-77) and 1977-78) at the students' instructional farm, Kanpur to find out the optium dose and appropriate time of application of Tribunil and igran for the control of phalaris minor in sandy loam soil of central U. P. The study revealed that pre - emergence application of tribunil or igran @ 1.0 kg ai/ha controlled phalaris minor to a desired level which resulted into equal or highest grain production to that obtained by weed free treatment. Early post-emergence application of tribunil or igran at 25 days after sowing @ 1.0 kg ai/ha proved the next alternative for the control of this obnoxious weed in dwarf wheat.

DOSANEX-A SELECTIVE WEE KILLER IN wHEAT

D. K. Rathi and A. N. Tewari
Department of Agronomy C S. Azad University of Agriculture and Technology. Kanpur.

Two years field investigation conducted at Kanpur during *rabi* 1976 - 77 and 1977-78 in sandy loam soil with a view to find out the optimum dose and mode of application of Dosanex for Phalaris minor control, revealed that post-emergence application of Dosanex @ 0.75 kg ai / ha after 25 or 30 days after sowing gave satisfactory weed control and higher yield.

EFFECT OF HERBICIDES ON YIELD AND CHEMICAL COMPOSITION OF WHEAT GRAIN

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*Jawaharlal Nehru Agricultural University, Jabalpur.

**Department of Agriculture, Imphal Manipur.

The present investigation was carried out to assess the efficacy of certain pre and post emergence heribicides on grain yield and chemical composition of Dwarf wheat. ToK-E-25, 1 lit a. i per hectare produced maximum yield of 43.94 Quintals per hectare, followed by hand weeding (40.56 Q/ha) and Basagrane (37.45 Q/ha) respectively. Protein content was maximum (12.54) under 2, 4-D ester and lowest under 0 75 lit ToK - E - 25. Phosphorus uptake was maximum in ToK-E-25 treated plants. The results of the present study clearly indicate the usefulness of some of these herbicides in increasing grain yield and its quality over unweeded check and even hand weeded control.

STUDIES ON THE CONTROL OF PHALARIS MINOR IN WHEAT

V. M.Bhan, P. S.Negi, D. Singh and G. Singh

Department of Agronomy G. B. Pant University of Agriculture and Technology, Pantnagar.

Metaxuron, phenoxaline, methabenzthiazuron were found to be effective broad spectum herbicides against *Phalaris minor* and other broadleaved weeds Pre-plant incorporation of fluchloralin also resulted in good control of *P, minor*, doses higher than 1 kg/ha caused recuction in grain yield. Pre - emergence application of phenoxaline at 2 kg/ha and methabenzthiazuron at 2 kg / ha and post emergence application of metaxuron 2 to 3 kg / ha 35 days after sowing gave grain yield *at par* with that obtained under weedfree condition.

WEED CONTROL IN WHEAT FIELDS. 1. RESPONSES OF ASSOCIATED WEEDS AGAINST SPRAYED HERBICIDES

A. N. Rao, P. S. Dubey and L. P. Mall
School of Studies in Botany, Vikram University, Ujjain

Quantal and Quantitative responses of important weeds associated with wheat var. Malavraj viz., *Chenopodium album*, *Canvolvulus arvensis* L., *Cynodon dactylon pers*, *Launea nudicaulis* H. K., *Mellilotus alba* Lamk and *Sonchus arveusis* L. against post emergence spraying of five herbicides viz., Monolinuron, Atrazine, 2, 4-D, Cyanazine and Simazine has been reported in the present paper. Quantal responses revealed that 2, 4-D was most efficient in controlling weeds and it activity increased with the additien of isoparaffin oil surfactant. Cyanazine, a triazine heribicide is the next efficient herbicide, whose efficience has enhanced with the increase in concentration *Cynodon dactylon* is comparatively resistent to this herbicide. Other herbicides eventhough efficient in controlling the weeds, are found to be toxic to the crop. Quantitative responses of the weeds in wheat field revealed that the maximum reduction in biomass occured with 2 kg/ha dosage treatment of 2. 4-D when sprayed along with the surfactant. next maximum reduction was observed by *Cyanazine* 2 kg/ha (with surfactant) treatment.

STUDIES ON COMPARATIVE EFFICACY OF HERBICIDES IN CONTROL OF WEEDS IN WHEAT

T. Singh, S. N. Sharma and K G. Gautam
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Field investigations were carried out with wheat variety RR-21 for two seasons in *rabi* 1674-75 and 1975-76 at the Research Farm of the Department of Agronomy, Banaras Hindu University, Varanasi for studying the relative efficacy of 2,4-D MCPA terbutryne diuran and simazine in conrol of weeds and their effect on yield attributes and yield of wheat.

All the herbicidal treatments significantly reduced the weed density and drymatter accumlation by them. Among the herbicides 2,4-D. and terbutryne (post-emergence application) resulted in more effective control of weeds. The depletion of NPK in soil by weeds was significantly brought down by herbicidal treatments.

All the herbicides except simazine produced more tillers and dry-matter of crop. Post-emergence application of 2,4-D, (Na-Salt) at the rate of 0 . 75 kg a. e. /ha registered the highest number of grains/ear head and grain yield of crop. Simazine application at all the concentrations (0 . 25, 0 . 50, 0 . 75 and 1 . 0 kg/ha) was found phytotoxic to the crop and resulted in lower grain yield as compared to other herbicidal traeatments.

WEED CONTROL IN WHEAT - AN INTEGRATED APPROACH

T. Singh, S. K. Sharma and K. C. Gautam
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Field experiments were conducted during *rabi* 1974-75 and 1975-76 at the Research Farm of the Department of Agronomy, Banaras Hindu University, Varanasi to study the interaction effect of wheat cultivars to herbicides. Wheat varieties RR-21, WG . 377, S . 308 and HD-1553 were included in these trials and subjected to application of three herbicides namely, 2,4-D (Na-Salt), MCPA and terbutryne. Weedy check was also maintained.

RR-21 and WG-377 produced significantly more number of tillers over S 308 and HD-1553. 2 4-D and terbutryne registered statistically more number of tillers compared to MCPA and weedy check. Variety WG . 377 resulted in higher grain and straw yield in comparison to RR-21, S . 308 and HD-1553.

Interactions were also found significant WG . 377 x 2,4-D recorded significantly more grains per ear head and grain and straw yield of wheat. Uptake of NPK by crop was highest under WG . 377 variety coupled with post-emergence application of 2,4-D.

Weed growth was significantly brought down under WG . 377 variety when sprayed with 2,4-D as compared to other treatments. Depletion of major nutrients such as NPK in soil by weed growth was minimum in RR-21 and WG . 377 under 2,4-D and terbutryne application. MCPA was least effective in checking nutrients drain by weed growth.

The data in this study provided clear evidence on the selectivity of 2,4-D, MCPA and terbutryne to the four wheat cultivars

WEED CONTROL IN IRRIGATED WHEET

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An experiment was conducted in the farm of Ranchi Agricultural College, Kanke (Rejendra Agricnltural University) during 1976 and 1977 to assess the efficacy of differant weed control methods in irrigated wheat (*Triticum aestivum* L. Janak). The herbicides 2, 4-D (1.25 kg/ha), Tok-E-25 (2 lit/ha), Tribunil (2 kg/ha) as per-emergence and 2, 4-D (1.25 kg/ha) as pre + post emergence were compared with the weed free and unweeded checks The common weed flora comprised of *Melilotus alba, Chenopodium album, Vicia hersuta, Solanum nigrum, Vicia sativa, Funaria parviflora, Gynophalum indicum, Oldenlandia corymbosa, Cyperus* Sp., *Cynodon dactylon. Medicago denticulata,* of which *Vicia hirsuta* was the major weed. 2, 4-D was found to be the most effective in weed control. The effectiveness of 2, 4-D was also reflected in yields. The yield under weed free check was 2495 kg/ha, and 2502 kg/ha during the year 1976 and 1977 respectively. As against this, 2, 4-D pre + post-emergence treatment gave 2362 and 2472 kg / ha, followed by 2, 4-D post - emergence with 2286 and 2422 kg / ha and 2, 4-D pre-emergence with 2133 kg / ha and 2232 kg/ha. Tok E-25 (2076 and 2202 kg/ha), Tribnnil (2038 and 2032 kg/ha) gave lower yields during 1976 and 1977 respectively. Most of the weeds were broad leaf and probably this was the reason of effectiveness of 2, 4-D.

WEED CONTROL IN WHEAT FIELDS. 2 RESPONSES OF WHEAT VAR. MALAVRAJ AGAINST FIVE HERBICIDES.

A. N. Rao
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Height, pigment concentration and yield components (number of grains per ear, 100 grain weight, grain yield and straw yield) of wheat var, Malavraj as influenced by post emergence herbicides - monolinuren, atrazine. 2, 4-D, Cyanazine and Simazine have been reported in the present paper 2, 4-D was found to be best selective herbicide in controlling the weeds 2, 4-D, 1 kg / ha and 2 kg/ha dosage treatments without surfactant increased the grain yield of wheat, the grain yield with 2, 4-D 1 kg/ha + surfactant treatment was greater than the same dosage rate without surfactant. 2, 4-D 2 kg/ha + surfactant

caused reduction in wheat grain yield and hence 1 kg / ha dosage rate along with surfactant was recommended for weed control in wheat var. Malavraj fields Post emergence treatment of cyanazine at the dosage rate of 1 kg/ha both with or without surfactant is found to control the weeds efficiently and thus resulting in considerable increase in grain yields, Cyanazine 2 kg / ha along with surfactant was phytotoxic to whcat. Other herbicides ware phytotoxic to wheat at all dosage rates studied.

NEW HERBICIBDES FOR WEED CONTROL IN WHEAT

V. S. Mani, N. T. Yaduraju and Bhagwandas

In a replicated field trial carried out dur ing 1977-78 at IARI, New Delhi, the highest grain yield (62 qh/a) was obtained with 2,4-D amine 0 . 5 L/ha applied after 2nd irrigation followed by, hand weeding (61 q/ha) and terbutryns 1 kg/ha pre-emergence (59 q/ha). Basalin 0 5 L/ha applied at first irrigation gave 58 . 5 q/ha. Unweeded control yielded 40 . 5 q/ha. New herbicides-average 2 L/ha applied post-emergence and super suffix 2 L/ha post-emergence application gave 57 , 7 and 53 . 2 q/ha respectively, and were on par with hand weeding. Only tribunil at 2 kg/ha applied as either post-emergence or 1 kg pre and 1 kg post-emergence gave significantly lower yield as compared to control.

CROP - WEED COMPETITION IN WHEAT CROP

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A field trial was conducted at Agricultural Farm, S. D J. Post-Graduate College Chandesar, Azamagrh during the rabi season of 1977-78, to study the crop-weed competition in wheat variety-Kalyansona. Weed free condition upto 7, 14, 21, 28 35-49 and 56 days after sowing and un-weeded control formed the treatment. The trial was laid out in Randomized Block Design with four replications. The soil of sxperimental field was sandy loam Weed free condition was maintained by giving manual weeding The predominant weed species in the field were Avena fatua, Chenopodium album, Asphodelus tenuifolius. Anagallis arvensis and Convolvuius arvensis etc.

The results indicated that weed free conditions upto 28, 21 and 35 days after sowing were highly effective in increasing the grain and straw yields Maintaining weed free condition beyond 42 days after sowing did not enhance the grain and straw yields significantly

INVESTIGATIONS ON HERBICIDAL AND SELECTIVE EFFECTS OF 2,4-D, METH ABENTHIAZURON AND TERBUTRYNE IN TWO CULTIVARS OF DWARF WHEAT

Jitendra Pandey and V. S. Mani

Field trials conducted for two seasons (1975-76) in a split plot design with four replications comprised two varieties (Sonalika and Arjun) three nitrogen levels (40, 80 and 120 kg N/ha) as main plot treatments and five weed control treatments (weedy check, hand-weeding, post-2m 2,4-D at 0.5 L/ha, pre-em, tribunil and terbutryne each separately at 2 kg and 1 kg/ha respectively as sub-plot treatments.

All the three chemicals reduced the weed population and amongst these tribunil and trebutryne which were applied pre-em. were found more effective than 2,4-D which was applied 35 days after sowing. Tribunil had an edge over trebutryne in checking the accumulation of dry matter by weed growth.

Increasing dosage levels of nitrogen suppressed weed population but promoted the accumulation of dry matter in weeds.

Weed control treatments on an average stepped up grain yield by 4 q/ha over weedy check. Grain production under pre-em application of either tribunil or terbutryne resulted in a significant increase over hand weeding and a post-em. application of 2,4-D thereby illustrating the beneficial advantage of ensuring a weed free environment to the crop by the pre-em technique Ear deformities were observed in Arjun due to 2,4-D post-em spray.

EFFECT OF DIFFERENT WEEDICIDES ON THE GROWTH AND YIELD OF WHEAT CROP

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Different weedicides were evaluated for their weed control efficiency in wheat crop. Avenge, eptam 7E, RH-2915, stomp 330 E, tok E, 25

Vernam 7 E, weedazol and weedone were used as post-emergance application. The weed flora recorded in the untreated control cosisted of: *Chenopodium album, C. murale' Echinops (echinotus) Asphodelus tenuifolius, Amaranthus hybridus, Trianthema portulacastrhm* among dicots and *Digitaria adscenoides* and *Cyperus rotundus* among monocots. Avengle controlled most of the the dicot weeds, but grasses were found resistant although the crop yield increased considerably. Eptam-7 E showed the control of weeds only at seedling stage. RH-2915 controlled all the weeds including the most obnoxious *Cyperus rotundus.* A very toxic effect on crop was also observed which resulted in reduced yield. Stomp 330 E and tok E-25 controlled most of the weeds at initial stages. Little phytotoxic effect on crop was also noted. Vernam 7-E was found to be the best among all the weedicides tried. An increaseof 24.36 percent in crops yield was noted. Weedazol caused severe chlorosis in all the weeds as well as in crop plants. No grains developed although the ear formation had occurred earlier. Weedone killed all the dicot weeds by causing dropping and wilting in leaves. The weedicide was found to be toxic to crop although maximum tillering occurred in this case.

TOLERANCE OF WHEAT CULTIVARS TO HERBICIDES.

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In field experiments conducted in the Punjab Agricultural University, Ludhiana (Punjab) during 1974-75 and 1975-76, wheat cultivars showed significant differences for their tolerance to chlortoluron. Plant height of cv WG 357 was significantly suppressed by chlortoluron 0 . 75 kg ha pre - emergence and 0 5 kg early post-emergence as compared with the crop given two hoeings and the weedy check (control). The other varieties i. e. Kalyan Sona, PV 18, and S 308 (Sonalika) showed good tolerence to chlortoluron, methabenzthiazuron and nitrofen. Differencess in grain yield among the weed control treatments were significant during both the years. The interaction for varieties x weed control treatments was significant during both the years. The grain yield of cv wc 357 from chlortoluron treated plots was significantly inferior to the grain yield of this cultivar from methabenzthiazuron and nitrofen treated crop Dur ng 1974-75. cv wG 357 gave 2580 kg / ha grain yield from chlortoluron pre-emergence treatment against 4870 kg and 5030 kg / ha grain yield from methabenzhiazuron and nitrofen treated crop.

SELECTIVE CONTROL OF WILD OATS (*Avena Ludoviciana Dur*) WITH HERBICIDES IN WHEAT (*Triticum Aestivum* L)

H. S. Gill, L S. Brar and U. S Walia
Punjab Agricultural University, Ludhiana, India

Avena ludoviciana Dur. (wild oats) and *Pha'aris minor* Retz. (Canary grass) have become a serious weed problem in wheat in Punjab aud some adjoining states. In field trials conducted in the Punjab Agricultural University, Ludhiana (India) during 1974-75 and 1975-76, benzoyl prop ethyl 1 . 0 kg/ha at and of tillering crop stage, metoxuron 1 . 2 kg/ha at mid tillering stage of crop, methabenzthiazuron 0 . 7 kg/ha and barban 0 . 625 kg/ha as early post-emergence (2 . 5-3 leaf stage of crop and 1 . 5 to 2 . 0 leaf stage of wild oats) gave effective control of wild oats. On ench light texture soil (loamy sand), methabenzthiazuron as early post-emergence was more effectlve than its pre or post-emergnce (treated after first irrigation, crop in 2-3 tiller stage) application. Benzoyl prop ethyl at 1 . 0 kg/ha was more effective when applied at first node formation of the crop (50 days after sowing crop in 5-6 leaf stoge) than its application at mid tillering stage (35 days after sowing). The performance of benzoyl prop ethyl was more consistent in both the years and it gave an average of 3720 kg/ha grain yield against 3290 kg for triallate (standard treatment), 3570 kg for hand weeded crop and 1450 kg/ha in case of unweeded plot (weedy check). Matoxuron, barban and methabenzthiazuron also resulted in appreciable increase in grain yield and were comparable with the standard treatment (triallate).

CONTROL OF WILD OATS (*Avena Ludoviciona* DUR.) AND OTHER WEEDS IN WHEAT WITH METOXURON

H. S. Gill, Tarlok Singh & U. S. Walia
Punjab Agricultural University, Ludihiana

In field experiments conducted in the Punjab Agricultural University, Ludhiana during 1974-75 and 1975-76, metoxuron as pre-emergence (0 . 8, 1 . 2 and 1 . 6 kg/ha) early post-emergence (0 . 8 kg/ha 16 days after sowing, wild oats in 1 . 5 to 2 . 5 leaf stage) and post-emergence (1 2 kg/ha 50 days after sowing) gave an effective control of wild oats, *Chenopodium atbum*,

Melilotus alba, Medicago denticulata, Lapidium sativum and *Anagallis arvensis*, but it did not control *Fumaria parviflora*. Metoxuron treatments gave significantly lower dry matter of weeds than the unweeded crop and its performance was comparble with triallate pre-plant soil incorporation (1 . 25 kg/ha) during 1974-75. But during 1975-76, metuxoron pre-emergence at higher rates (1 . 2 and 1 . 6 kg/ha) and its post-emergence application were significantly superior to triallate for control of wild oats.

Differences in grain yield were significant during both years and the metoxuron treatments gave 210 to 570 kg/ha increase in grain yield during 1974-75 and 220 kg to 370 kg/ha over weedy check (control) during 1975-76.

The nonsignificant interaction between varieties (PV 18, WG 377, Kalyan sona) and weed control treatments for grain yield for both years revealed that metoxuron was well tolerated by these wheat cultivars.

EFFECT OF SUB-LETHAL DOSES OF SIMAZINE ON FODDER OATS.

N. T. Yaduraju, Amarjeet Sing and V. S. Mani

A replicated field experiment to study the stimulatory effects of sub-lethal doses of simazine was carried out during 1977-78. Simazine doses employed were 16, 32 and 64 grams/ha. The three doses were applied separetely either one month before Ist cut or immediately after Ist cut or repeated both the time. Simazine dosage level of 16 gm/ha applied one month prior to first cut gave the highest yield and was significantly superior to untreated control.

STUDIES ON THE CHEMICAL CONTROL OF WEEDS IN VEGETABLE PEAS

V. M Bhan and S. S. Tripathi
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Pre-emergence application of alachlor at 0.75 kg/ha along with one hand weeding 30 days after sowing gave maximum weed control and highest yield

of green pods followed by methabenthlazuron at 3.0 kg / ha, alachlor at 1.0 kg/ha and linuron at 0.5 kg/ha. Fluchloraline delayed germination of peas and was also found toxic, resulting in low yield of green pods.

INTEGRATION OF CULTURAL AND CHEMICAL METHODS FOR EFFECTIVE WEED CONROL IN MUNG AND MASH

Jai Prakash and S. K. Pahwa
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Integration of hand weeding and pre-emergence application of herbicides has been found to be more economical and less labour requiring. Mung (*Vigna radiata* (L) Wilezek) and Mash (*Phaseolus mungo* L.) are two important pulse crops of rainy season. These crops get infested with both dicot as well as monocot weeds. Pre-emergence applications of alachlor, fluorodifem and nitrofen 0 . 1 and 1 . 5 Kg/ha in both the crops reduced all types of weeds in comparison to control. Weed population started increasing in herbicide treated plots after 30 days. Hand weeding of such herbicide treated plots 40 days after treatment increased the yield of pulses over hand weeding or herbicides alone. Integration of hand weeding and herbicides thus reduces labour as well cost on herbicides.

STUDIES ON CHEMICAL WEED CONTROL IN SOYBEAN

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Field investigations, with Bragg variety of soybean, were carried out for two seasons in *Kharif* 1975 and 1976 at the farm of the Indian Agricultural Research Institute, New Delhi for comparing the relative efficacy and selectivity of some newer herbicides namely fluchleralin, methabenzthiazuron, metribuzir e, rowmate, ronstar, penoxalin and bentazone with recommended herbicide alachlor as well as with manual weedings and weedy check treatments.

All the herbicides reglstared significantly higher grain yield over weedy check and the yield under these herbicides was at par with alachlor and manual weeding treatment. It was observed that the weeding given 30 days after sowing effected adequate weed control and pushed up the grain porduction significantly comparable with two and three weeding treatments.

Dry matter production of weed was significantly reduced under all the herbicidal and manual weeding treatments as compared to weedy check; thereby indicating that all these treatments effected a good control of weeds.

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Papers on Weed Control

in Rice.

EFFICIENCY OF GRANULAR HERBICIDES AND CULTURAL METHODS *IN CONTROLLING WEEDS IN RICE*

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Granular forms two esters (Isopropyl and Ethyl esters) of 2. 4-D @ 1.0 and 1.5 kg. a. i./ha each were compared with Butachlor (G) 2 . 0 kg, Nitrofen (G) 2 . 0 kg, Propanil 3 01 + 2, 4-D Na salt 0,8 kg a. i./ha, hand-weeding (twice), weed free check and unweeded control during 'Kharif' 1978 for their efficiency of contolling weeds. The weed flora in tho experimental field were *Echinochloa* spp., *Cynodon* spp., *Cyperus* spp., *Fimbristylis* spp., *Ammania* spp , *Ludowigia* spp, *Eclipta alba*, *Monochoria vaginalis*, *Potamogeton*, *Anargallis arvensis* etc The best weed control in terms of weed count was obtained under Butachlor followed by 2, 4-D EE 1.5 kg /ha. among the herbicides and the number of weeds was even less than hand weeding twice The least dry weight was obtained under 2, 4-D EE 1.5 kg/ha. Effective tiller production and plant height were maximum with 2, 4-D EE 1.0 kg/ha. Light transmission ratio was maximum with Butachlor Fertile florets were recorded highest under Nitrofen followed by Bropanil + Na — salt of 2, 4-D and the lowest under 2, 4-D IAF 1.5 kg/ha. 2, 4-D IPE 1 0 kg ai/ha however showed higher fertile florets. For a short duration rice variety like Pusa 33 - 30 application 2, 4-D IPE at 1.0 kg/ha gave higher grain yield (49 48 q/ha) followed by Nitrofen (49.17 q/ha) than unweeded control. These treatments were statistically at par with weed free check and hand weeding (twice).

STUDIES ON THE RICE-WEED COMPETITION UNDER DIFFERENT RATES OF NITROGEN AND HERBICIDES

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Field investigation were carriedout with rice variety IR-8 for two seasons in kharif 1974 and 1975 at the Research Farm of the department of Agronomy, Banaras Hindu University, Varanasi, to study the crop weed competition in direct seeded rice under varying levels of nitrogen fertilization and herbicides.

Highest grain yield was produced under the combined application of Tok granular (2.5 kg a. e./ha) and Rogue (2.0 kg a. e./ha) closely followed by

the combined application of Stam F - 34 (2.5 L. a. e./ha) and MCPA (0.6 L a. e./ha) and hand wedding treatments. Application of combined herbicides with varying levels of nitrogen kept the weed growth under check and boosted the grain production as compared to individual herbicides application and un-weeded control.

INTEGRATED WEED MANAGEMENT STUDY ON WET LAND RICE

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A trial on transplanted rice was taken to study the relativa performance of different herbicides on control of weeds under different situations of water management. The treatments consisted of three water regimes in the main plot and four chemical methods of contol one conventional manual method and un-weeded control in the sub-plots. The main findings of the experiment are highlighted below.

In respect of water regimes continuous submergence (10 cm) have shown beneficial effect on controlling weeds by preventing the germination of most of the monocot and dicot weeds. Regarding herbicides pre-planting application of Basalin (48% Fluchloralin) and post-planting application of Weedone (4% G-2 . 4-DEE) after 8 days were found to be more effective than other herbicides. Minimum weed weight and maximum-grain yield was recorded in Basalin treated plots. Conventional manual method was next in order and at par with Basalin treated plots.

WEED CONTROL IN RICE UNDER SEMI DRY CONDITION

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An investigation was under taken at Agricultural College, Vellayani to compare and evaluate the effect of propanil, MCPA and Eptam with hand weeding for weed control in rice under semi dry conditions of Kerala.

Propanil (2 kg/ha) MCPA (1 kg/ha), propanil (2 kg/ha) plus hand weeding 45 days after sowing, combinations of MCPA and propanil (half the dose each) (propanil and MCAA applied 30 d. a. s. in all the treatments) and Eptam

6E (4.55 litre/ha) applied 3 d. a. s. were the treatments tried along with hand weeding (twice) and upweeded controls. Weed flora in the rice field under study were mainly constituted of grasses, sedges and dicots belonging to seven families and fifteen species.

Pre emergent application of Eptam prevented emergence of all groups of weeds effectively. Hand weeding (twice) gave 91 . 7% weed control, whie propanil (30 d. a. s.) in combination with hand weeding on 45th day gave 91.44% weed control MCPA was inferior to propanil when applied individually and could give only 82% weed control. The combined application of propanil and MCPA was least efficient and gave only 27% weed control.

Hand weeding twice resulted in maximum yieid of grain and straw followed by propanil in combination with hand weeding. Propanil was superior to MCPA in grain straw yield.

"CHEMICAL WEED CONTROL IN RICE" (UNDER IRRIGATION)

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Several species of weeds under irrigated rice have been identified and control of few types of weeds which resembles rice (viz *Echinocloa Species*) is very difficult by cultural method.

Alos effectiveness of different available weedicides in rice need to be studied under irrigated conditions.

With this object the weelicides viz (1) Weedone (2,4-D) (2) Machete, (*Batachlor both liquid and grannulas*) (3) Basalin (Flucloralin) have been tried on MR-272 (Mangala) transplanted rice during Kharif season of 1977-78 at Agricultural Research Station Siruguppa.

Machete (Butachlor) liquid has also been blended to 10 kgs of well sieved sand and broadcasted like granules to the rice. This treatment was taken to know the effectiveness of liquid weedicides on rice since most of the time the grannular weedicides are unavailable. And this type also reduces the application cost and handling of sprayers could be avoided, Out of the 12 treatments.

Machete (Butachlor) and Basalin (fluchloralin) weedicides have been found best both in control of weeds. and increasing the yields of grain and straw.

STUDIES ON WEED MANAGEMENT IN UPLAND PADDY.

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A field trial to study the effect of different weed control mathods on growth and yield of Upland Paddy variety Tuljapur - I, conducted in the monsoon season of 1978 - revealed that the following weeds were associated with the Upland Paddy crop. Cynodon dactylon, Cyperus rotundus, Panicum spp. Echinocloa crusgalli, Abutilon indicum, Acalypha indica, Tridex procumbens, Ipomea reniformis, psorslia Corylifolia and Solanum nigrum,

Eleven treatments comprising of chemical and cultural methods were tried in the Randomised Block Desing with four replications Machete and Saturn @ 2 . 5 lit and 2 . 5 Kg a. i / ha respectively as preemergence and their combination with stam, F-34 and 2,4-D (ester) @ 2 . 5 lit. a i. at 6 weeks stage of the crop were compared with one weeding and hoeing at 3 week stage of the crop followed by the post-emergence sprayings of stam, F-34 and 2,4-D (Ester) at 6 weeks stage, two weeding and two hoeings, weed free plot and Absolute Control with no weedings and cultural operation.

Results indicated that as the maximum weed index increased the yield of upland paddy was reduced. Maximum yield of 18 . 33q/ha was obtained in weed free plots followed by the treatment of two weedings and hoeings done at 3 and 6 weeks stage of the crop giving yield of 17 . 48 Q/ha. These two treatments were at par. The third best treatment was one weeding at 3 weeks followed by the spraying of Stam, F-34 @ 2 . 5 lit. a. i. / ha at 6 weeks Under normal conditions the cultural practices of 2 hoeings and 2 weedings is proved effective in controlling the weeds in Upland Paddy. In case wet climatic conditlons or shortage of labour prevail the treatment of one hoeing and one weeding at 3 weeks followed by spraying of Stam, F-34 at 6 weeks would be also profitable. Studies on the economics involved also indicated the similar trend.

INTEGRATION OF WEED CONTROL PRACTICES IN RICE.

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In rice (*Oryza sativa* L.) mostly a single weed control practice is adopted which may give rise to difficult weed problems The different weed control measures in rice which can be combined to form a good weed management system is discussed in this paper. Repeated cultivation at 1 to 3 week intervals before seeding reduces barnyardgrass and other annual grass infestation. Deep ploughing upto 25 to 30 cm, in transplanted rice, reduces annual (12/sqm) and perennial (162/sqm) weeds. Puddling too keeps the weed intensity down as compared to dry land preparation. The seeding of rice seed, free of weed seed contamination should be practiced as a preventive measure of weed infestation. Judicial use of nitrogen and phosphate, under different situations, can suppress weed growth. Flooding rice upto a depth of 15 cm reduces grasses (O/sqm), sedges (O/sqm) and broadleaf weeds (10/sqm). A tall variety, Saket-1 (145 cm height) can compete with weeds better than a dwarf variety, Ratna (92 cm height). It has been observed that taller the rice plant, lower is the weed infestation. Hill spacing has a marked effect on weed intensity. Best weed control can be achieved at 10 x 10 cm spacing. Manual and mechanical weeding, which are still practiced by rice growers should be adopted according to specific situations. Chemical weed control, using cheap and available herbicides like 2,4-D and MCPA, can be practised by looking into weed problem and cost-benefit ratio Rotating upland corps (corn + peanuts) with lowland rice keeps the total number of weeds lower and produces higher grain yield (2 · 2 q/ha) than growing continuous lowland rice.

Integration of one or more of the above mentioned methods of weed control in rice must be effective, economic and environmentally safe.

PERFORMANCE OF A RICE VARIETY 'ASWATHY' UNDER DIFFERENT METHODS OF SEEDING AND WEED CONTROL

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A field experiment was conducted at the Instructional farm of the Kerala Agricultural University, Vellanikkara to determine the relative efficiency of different methods of weed control and fix the optimum spacing for the rice variety 'Aswathy' under weed control semi dry conditions. There were five treatments under weed control i.e, Stam F-34@1.5 kg/ha (post emergence application), Machete @ 1.5 kg/ha (pre-emergence appljcation), gramaxone @ 2.5 litres/ha (pre sowing application), hand weeding and unweeded control and four treatments under spacing of flow line seeding i e. 30 cm lines, 45 cm lines, 60 cm lines & control (i e. 1.5 cm x 2 cm dibbling). This experiment was laid out in a split plot design. The results of the experiment indicated that application ef machete at 1.5 kg/ha gave higher yield when the seeds were sown at 45 cm lines.

INTEGRATED APPROACH FOR EFFICIENT WEED MANAGEMENT IN UPLAND DIRECT SEEDED PADDY UNDER IRRIGATED CONDITION

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This study was made in sandyloam soil under Central U. P. conditions at Kanpur during *Kharif*, 1977, in a 3 replicated randomised block design in irrigated drilled paddy. The study revealed that application of chemical alone failed to provide satisfactory control of weeds and necessity of removal of weeds by hand weeding even after the use of chemical was clearly established. Machete followed by one hand weeding about 25 days after sowing could bring the yield of paddy at par with complete weed free condition created by manual weeding thrice. The schedule of weed control through this combination may be considered a better alternative to manual weeding thrice as it reduced the labour requirement from 105 to 38/ha and total cost from Rs. 577·50 to 429 . 00/ha.

INVESTIGATION ON CHEMICAL WEED CONTROL IN UPLAND AND LOWLAND RICE

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An experiment was conducted at Ranchi Agricultural College Farm, Kanke during 1976 and 1977 to study the efficacy of three herbicides viz., Machete, Benthiocarb and Stam F-34 on the weeds of both upland and low land rice (*Oryza sativa*). The treatements were four doses of each of the three herbicides viz., 2, 3, 4 and 5 lit/ha (actual). Machete and Benthiocarb were applied as pre-emergence and Stam F-34 as post emergence. There were also two checks viz. unweeded and weeded. The herbicidal efficiency was assessed in terms of weed population and dry matter accumulation. The weed flora in upland consisted chiefly of : *Echinochloa colonum, Setaria glouca, Brachiaria ramosa, Panicum* Sp. *Commelina indica, Commelina benghalensis, Dactyloctenium agyptium, Ageratum conyzoides, Eleusine indica, Cynodon dactylon, Cyperus* Sp. *Disitaria longifolia, Tridax procumbens.* The low lands which support only the paddy crop of different durations depending on the period that optimum moisture is available is dominated by weeds such as *Commelina nudiflora, Echinochloa colonum, Panicum repens, Commelina benghalensis, Cyperus* Sp. *Fimbristylis miliacea, Ecchornia crassips, Monocharia vaginalis and Ludwigia parviflora.*

The pre-emergence herbicides were applied within 48 hrs of the seeding in case of upland paddy and 7 to 10 days after transplanting in low land paddy. The post-emergence application of Stam F-34 was given when weeds were at 2 to 3 leaf stage. Herbicidal efficacy was best in the treatments where the highest dose of Machete and Stam F-34 was applied 5 lit/ha (actual) in both the years. In upland paddy, the highest dose of Machete and Stam F-34 gave average yields of 1640 and 1610 kg/ha in 1976 and 1556 and 1639 kg/ha in 1977 respectively and these were at par with those of weeded check (1780 and 1723 kg/ha). In low land paddy also the highest dose of the two herbicides, proved most effective, the average yields being 2530 and 2175 kg/ha in case of Machete and 2440 and 2256 kg/ha in case of stam F-34 during the two seasons as against 2560 and 2303 kg/ha in weeded checks, unweeded checks gave the lowest yields of 220 and 1139 kg/ha in upland and 2030 1684 kg/ha in low land. The weed population and dry weight of weed were also lowest in these treatments.

COMPARISON OF EFFICIENCY OF SOME HERBICIDES IN RICE CROP ON THE YIELD.

K. S. S. Easwaran

Field trials were carried out to evaluate the efficiency of many herbicides to control weed plants which existed in rice fields. Following weeds were observed in the fields. *Ipomoea reptans, Eclipta alba. Echinochloa colona, Bergia capensis E. crusgalli, Hydrolea zeylamica and Marselia quadrifoliata.*

Results indicated that butralin, nitrofen and avirosan were less effective when compared to butachlor, penoxalin and dinitramine. These herbicees were applied at the rate of 2 . 0 kg/ha. Butachlor, Penoxalin and dinitramine treatments reduced the weed population and dry matter content. This brought about an increase in the yield of rice .

EFFECT OF DIFFERENT GROUPS OF WEEDS AND PERIODS OF WEED MAINTENANCE ON THE GRAIN YIELD OF DRILLED RICE.

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A field experiment was conducted during kharif 1975 at the crop Research Centre of G. B. Pant University of Agriculture and Technology, Pantnagar, Uttar Pradesh. The object of the experiment was to find out the effect of different groups of weeds as well as different weed free periods on the yield of drilled rice. The results indicated that the maximum yield of 57.79 q/ha was recorded in treatment Weed free upto 45 days from sowing time as compared to 19 . 86 q/ha in zero days weed free plots (no weeding). An increase in grain yield of 64, 130 and 190 per - cent was observed with the increase in weed free periods of 15, 30 and 45 days respectively as compared to zero days weed free (no weeding). Grain yield was significantly influenced when the crop was grown in association with grassy or grassy + broad leaved weeds. Broad leaved weeds did not influence the grain yield significantly at different weed free periods. *Echinochloa crusgalli* was a major grassy weed found in the experimental plots.

CHEMICAL WEED CONTROL IN RICE

V. S. Mani, N. T. Yaduraju, Mrs. Gita Kulshrestha and S. P. Singh

Experiments have been in progress for studying the herbicidal and selective value of chemicals in rice raised under direct seeding and transplanted conditions.

Methods of planting as main plot treatments were : direct seeded, transplanted on puddled and non-puddled soil. In the non - puddled conditions, weed growth prior to transplantation was hit by paraquat (Gramaxone) at 4L/ha. The sub plot treatments comprised weed control measures (unweeded, manual-weeded), early application of butachlor and ben thiobencarb granules separetely post-em spray with propanil (Stam F-34) and bentazone (Basagran) separately and a combination of these.

Rice grain yield was pushed up in direct seeded series by herbicides. Rice yield under non puddled condition in transplanted series was also maintained at a high pitch. Highest grain production was secured in the transplanted rice on intensely puddled soil.

STUDIES ON CROP - WEED COMPETITION IN DIRECT SOWN RICE UNDER PUDDLED AND NON-PUDDLED CONDITIONS

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Field experiments were conducted in direct sown rice (Var.) Bhavani which was erect in habit and a semi - tall variety with a dutation of 130 days. A seed rate of 100 kg / ha was adopted. Weed free periods were maintained by hand weeding at 10 days interval upto 90 days and compared with unweeded control. *Echinochloa crus-galli* (L.) Beauv under puddled condition and *Echinochloa colonum* (L.) Link in non-puddled condition were the predominant grass weeds. These weeds competed with rice at all stages. Among sedges *Cyperus difformis* L was the predominant and its competition was severe in early stages under puddled condition. *Cyperus iria* was the most pre-dominant weed in non - puddled condition. *Eclipta alba* was a dominant dicot weed under both the conditions. *Ammannia baccifera* L. and *Marsilea quadri-*

foliate L were present in puddled condition only. In both the seasons, unchecked weed growth in puddled rice caused 53 per cent reduction in grain yield while under non puddled condition it was 91 per cent. For higher yield in puddled rice weed free period upto 50 days in monsoon and upto 30 days in summer were required. In non - puddled condition it was upto 60 days in monsoon and 70 days in summer to get higher grain yields.

RESIDUAL EFFECTS OF HERBICIDES APPLIED TO DIRECT SOWN RICE UNDER PUDDLED AND NON-PUDDLED CONDITIONS.

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Herbicides butachlor 1 . 0 kg/ha, benthiocarb 1 . 0 kg/ha and penoxalin 0 . 75 kg/ha were applied individually as pre-emergence on eighth and twelfth day after sowing to direct sown rice (Var.) Bhavani under puddled and non-puddled conditions They were also applied as mixture with propanil as early post-emergence on sixteenth day after sowing. The experimental fields were deep and moderately clayey. In the residual studies conducted after the harvest of rice, there was no adverse effect on the germination and dry matter production of cotton, finger millet, black gram and sesamum in both the seasons.

STUDIES ON CHEMICAL WEED CONTROL IN RICE

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Field trials were conducted at the Agricultural College Farm, Bapatla during 1973-75 for testing the efficacy of certain latest herbicides including granular formulations. The results indicate that application of fluorodifen @ 3 . 3 kg/ha at three weeks after transplanting paddy was found to be the best followed by application of dowco-221 granules at 37 · 5 kg/ha on the 8th day after transplanting rice. The next compound was found to be molinate sprayed @ 4 · 0 kg/ha, All the herbicides tried are found to be non toxic to the crop.

HERBICIDE SCREENING TRIAL FOR DIRECT SOWN RICE UNDER UPLAND CONDITIONS

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A field experiment was conducted during kharif 1978 - 79 at Agricultural Research Station Mugad a malanad tract (Dharwar Dist.). to identity the suitable herbicides for upland drill sown rice culture (IET-2254). The experiment consisted of 12 treatments all together viz. preemergent application of 1) Pendimethalin 33% at the rate of 2 kg a. i./ ha 2) Butachlor 2 kg a. i./ ha 3) Butralin 2 kg a. i./ha 4) Piperophos 40% at the rate of 1.6 kg ai/ha 5) Dinitramine 25% at the rate of 1.5 kg ai/ha. 6) X-150, 30%at 4 kg a. i./ha 7) Oxadiazon 25% at 1 kg ai/ha. 8) oxybuluroben 24.5% at 0 5 kg ai/ha. 9) Dichlorotop methyl 36% at 0.8 kg ai/ha. 10) Proponl at 3 kg ai/ha. 11) Handweeded check 12) Untreated control. The rice variety IET - 254 was sown on 12th June 19·78 in RBD with 3 replications. The seeds were sown at the rate of 30 kg/ha. with a spacing of 20 cms between rows. The fertilizer dose was 100-50-50 kg NPK/ha, herbicides were applied on June 29, 1978.

The results of the experiment indicated that application of X-150 (30%) at the rate of 4 kg ai/ha 2 to 5 days after rice emergence was found to be very effective in controlling the weeds (mean dry weight of weeds / m sq. = 36.66 gm) and has recorded significantly highest grain yield (6729 kg/ha) followed by oxyblurofen at the tate of 0 5 kg ai / ha (mean dry weights of weeds/m. sq. = 19·33 gms. yield = 6671 Kg/ha), The lowest yield (2074 kg/ha) was recorded in untreated control with 407 · 33 gms of mean dry weight of weeds per meter sq.

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Papers on Weed Control

in Sorghum, Maize, Bajra.

STUDIES ON WEED CONTROL IN SORGHUM

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Field trails were conducted for two years (1977-78) to investigate efficiency of different herbicides in controlling weeds and influencing yield of sorghum (CSH-5) during *kharif* season. The new herbicides viz. basalin, tribunil. stomp—330E, dosanex and controlled release herbicide were tried along with some promising herbicides like atrazine, alachlor and mechanical methods.

Effective weed control (over 60 per cent) was obtained during both the years with two timely hand weeding and pre-emergence atrazine and alachlor. During both the years, maximum grain and stover yield was obtained with two hand weeding followed by pre-emergence atrazine (1977) and pre-emergence alachlor (1978).

Pre-emergence atrazine gave satisfactory weed control during both the years and favourably influenced grain and stover yield during 1977. During 1978, it ranked third in respect of yield while alachlor second. The results with other pre-emergence herbicies viz tribunil (1.4 kg ai/ha) and controlled release herbicide (15 kg/ha product) were found encouraging The post-emergence application of different herbicides had not favourable influence on weed control and yield of the crop.

Although pre-emergence basalin was found most efficient to control weeds, the plant population and yield of crop was found adversely affected by it during both the years inspite of lowering its rate of application from 1.5 to 1.0 kg/ha during second year. Pre-emergence Stomp-330E (2 kg a.i./ha) was also found to have adverse effect on the crop (1977) but in the next year its application at lower rate (1.0 kg) did not reveal any phytotoxicity. The controlled release herbicide, which was included only in 1978. at higher rate of 20 kg/ha (product) and also pre-emergence atrazine affected plant vigour in the initial period of 30 days during 1978.

RELATIVE EFFICACY OF CULTURAL AND CHEMICAL METHODS OF WEED CONTOL IN HYBRID SORGHUM (CSH-5).

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The investigation entitled " Relative efficacy of cultural and chemical methods of weed control in hybrid sorghum (CSH-5)" was carried out at the Agronomy Department Farm, Punjabrao Krishi Vidyapeeth, Akola, during *Kharif* 1977-78. The experiment consisted of fifteen treatments and was laid out in a randomized block design with four replications.

The pre or post-emergence spray of atrazine and a post-emergence spray of 2,4-D (Na or ethyl ester) were more effective than cultural treatments in reducing the population and dry weight of broad-leaved weeds. The post-emergence spray of 2,4-D (Na or ethyl ester) more effectively reduced the population of *striga* as compared to other weed control treatments. Weed-free and cultural treatments were more effective in reducing the population and dry weight of annual grasses than the various herbicidal treatments. Both cultural and chemical methods of weed control significantly reduced the dry matter accumulation by weeds as compared to unweeded control. The pre-emergence spray of atrazine combined with one hand weeding was as effective as the cultural treatment (cultvator's practice) in reducing dry matter accumulation by weeds. Cultural and chemical methods of weed control increasd protein content in grain as compared to unweeded control. Weed control efficiency as well as weed index values indicated the superiority of the sixty days weed-free treatment over other weed control treatments.

INTEGRATED WEED CONTROL IN SORGHUM

U, C. Upodhyay, V. B, Shelke, S. D. Choudhari and M. G. Sanap.

A field experiment was conducted at Sorghum Research Station, Parbhani in the monsoon season of 1978–79 to evaluate the efficacy of different weed control measures comprising of twelve treatments of chemical, cultural methods and their combinations along with three treatments having companlon crops of Groundnut, Mung and Tur with Sorghum. The studies indicated that minimum weeds (2 . 9 g/sqm) were observed in the treatment of weed free followed by

two weedings and 2 hoeings and these were at par with all the treatments except control and the plots with companion crops. The maximum yield (20 . 98 q/ha) of sorghum was obtained in the weed free treatment followed by the treatment of Atrazine 1 Kg a. i. / ha at 3 weeks after sowing followed by one cultural operation (hoeing) at 6 weeks stage of the crop (20 . 83 q/ha). These were significantly superior to control, and the plots having companion crop of groundnut and tur,

INTEGRATED STRIGA CONTROL IN SORGHUM

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Experiments were conducted at Sorghum Research Station, Parbhani during 1977 - 78 and 1978 – 79 Kharif season on screening of varieties and hybrids for striga resistance, chemical control of striga and effect of nitrogen application on striga emergence

The study indicated that 168, CS-3541, CSH-7, Bongan Hillo and SPV-103 were comparatively resistant lines to striga They could be utilised in breeding programmes.

Striga could be destroyed completely by spraying 20% urea or 5% ammonium sulphate solution at flowering. One or two sprayings after fortnight interval are sufficient to avoid further multiplication of striga seed. This method would be popular with the cultivators as they are reluctant to use 2, 4-D because of damage to cotton, groundnut, pulses and other crops.

There were no significant differences in striga emergence due to different levels of nitrogen. However, it was observed that low level of nitrogen (50 kg/ha.) increased the emergence of striga than higher levels and no nitrogen plot. Yield reduction due to striga could be reduced by the application of higher level of nitrogen.

NUTRIENTS UPTAKE BY CROP (SORGHUM]) AND WEEDS IN DIFFERENT CROPPING SYSTEMS IN RELATION TO DIFFERENT WEEDING INTERVALS

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An experiment was conducted on sandy loam soils during Kharif, 1977 at College Farm, Rajendranagar. Six weeding intervals and four cropping systems including sole crop of sorghum alongwith different rows of intercrop of mungbean in sorghum were involved to compare no weeding treatment with weed free treatments under different cropping systems.

The uptake of nutrients (N, P and K) by weeds on general was more as compared to that of sorghum crop till 30th day in no weeding treatment because of higher drymatter accumulation in weeds during this period. The uptake of nitrogen by weeds was similar to that of crop at harvest in no weeding treatment, where as phosphorus and potash uptake by weeds was more by 5.8 kg/ha and 56·6 kg/ha respectively as compared to sorghum crop It was also observed that the total uptake of nitrogen (219 05 kg/ha), phosphorus (51·06 kg/ha) and potash (263.53 kg/ha) by weeds as well as crop together was very low in no weeding treatment as compared to crop alone in weed free till harvest treatment (N= 304·88 kg/ha, P= 51·9 kg/ha). The difference between the total uptake of nutrients (crop + weed) in no weeding and weed free till harvest (crop) treatment might be due to an antigonestic effect of weedsown crop in uptake of nutrients when they are allowed to grow together. Further it was also noted that for every unit of 2 41, 0.64 and 3 62 kg of N, P and K respectively removed by weeds, there was a mean reduction of 100 kg of sorghum grain yield. Similarly cropping systems also significantly influenced the nutrient uptake by weeds and a decreasing trend of these nutrients uptake with the increase of number of rows of mungbean intercrop was found Lowest nuttients uptake by weeds (N= 36·0 kg/ha, P= 8·8 kg/ha and K= 56 kg/ha) in three rows mungbean intercrop treatment was observed as compared to other treatments. These findings evidantly showed that the nutrients losses by weeds is more in sole crop treatment as compared to intercrop treatments. Nutrient uptake by crop was also effected due to cropping systems. Highest P and K uptake was observed in sole corp of sorghum (P =45·63 kg/ha K= 254·13 kg/ha) treatment, where as N uptake was maximum (266.5 kg/ha) in one row mungbean intercrop treatment. Where as minimum nutrients up-

take was recorded in three rows mungbean intercrop treatment. From these results it is clearly evident that even though the nutrient losses by weeds was minimum in three rows mungbean intercrop treatment. the nutrients uptake by crop in the same was minimum which might be due to severe competition offered by intercrop at higher population to sorghum, resulting a poor growth and finally the total yield got effected.

INFLUENCE OF WEEDING INTERVALS AND CROPPING SYSTEMS ON WEED GROWTH IN SORGHUM CROP (*SORGHUM BICOLOR*, L.).

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A field experiment was conducted during Kharif, 1977 at College Farm, A. P. A. U., Rajendranagar to study the crop weed competition under different cropping systems in relation to different weeding intervals. Sorghum was spaced at 45 x 12 cm row spacing, while mungbean was intercropped at different spacing in between two rows of sorghum (45 cm) to maintain different populations of mungbean intercrop.

During the present study sixteen weed species belonging to nine families were observed. Amongest them only four species viz., *Legascea mollis, Panicum repens, Cyperus rotundus* and *Cynodon dactylon* constituted the major weed population, amounting to 69 · 2%, 14 · 8%, 7 · 6% and 6 · 7% of the total weed density respectivaly The weed *Legascea mollis* was found to be more aggressive in growth and was present throughout the crop growth period. Thus some of the weed species *Panicum repens, Cyperus rotundus,* and *Cynodon dactylon* as well as intercrop of mungbean were found to be very much effected by this weed. Weed population was maximum during the first 15 days age of thecrop in no weeding treatment and then it declined gradually till harvest Cropping systems significantly influenced the weed population However, there was no significant difference among different intercrop treatments, but there was significant difference as compared to sole crop of sorghum treatment From these results it can be concluded that intercrop suppressed the weed growth, but with the increase in their number of rows there was no significant effect on supression of weeds. At 15th. 30th, 45th and 60th day the total drymatter accumulation of weeds was 18 · 3, 4 · 31, 1 · 75, 1 · 66 times more than sorghum

crop in no weeding treatment respectively This ratio gradually decreased with the advance in age till harvest This indicated that the competition offered by weeds to the crop at earlier stages was more than the later stages. In case of cropping systems also the weed dry matter production was significantly reduced with the increase of intercrop row number upto two rows only, whereas in three rows of intercrop there was no effect on weed dry matter production. However, there was no significant difference between intercrop treatment, but there was significant difference between sole crop, of sorghum and intercrop treatments in relation to weed dry matter production of 6·13 q/ha, 8·04 q/ha and 7.4 q/ha in one row, two rows and three rows intercrop treatments respectively as compared to sole crop of sorghum treatment. These results indicated that the reduction of weed drymatter production can be achieved by increasing the plant population per unit area upto a certain limit. (One row mungbean) without having any adverse effort on main crop (sorghum) growth and yield.

EFFECT OF CROPPING SYSTEMS AND WEEDING INTERVALS ON THE GRAIN YIELD OF SORGHUM CROP (SORGHUM BICOLOR, L).

D, Chakradhara Rao and S M. Kondap

A field experiment was conducted during Kharif, 1977 at College Farm, A P. A. U., Rajendranagar to study the response of different cropping systems in comparison to sole crop of sorghum at different weeding intervals. Six weeding intervals and four cropping systems (sole crop of sorghum, one row, two rows and three rows mungbean intercrop in sorghum) were involved to compare. Sorghum was spaced at 45 x 12 cm row spacing, while mungbean was intercropped at different spacings in between two rows of sorghum (45 cm) to maintain different populations of mungbean intercrop.

There was a marked response of sorghum grain yield to weeding intervals in both sole and intercropping, which increased significantly with increased weed free environmental period. Maximum grain yield (66 . 3 q/ha) was recorded in weed free till harvest treatment, followed by weed free till 45 days (64 . 8 q/ha) and weed free till 60 days (64 . 3 q/ha) treatments which were on par with each other and significantly superior over all other treatments. Lowest grain yield was recorded in no weeding treatment (22 . 1 q/ha). Similarly total grain production (sorghum grain equivalents) also followed the same trend, but the treatments weed free till 45 days and 60 days were found on par with weed free till 30 days treatment. Cropping systems singificantly influenced the grain yield of sorghum Intercropping of mungbean

at two rows and three rows in sorghum had an adverse effect on the grain yield of sorghum and total grain production per unit area Among cropping systems one row mungbean intercrop gave higher total grain yield (60 . 42 q/ha) and total net profit (4957 Rs/ha) than did either the sole crop of sorghum or that of other intercrop combinations. The interaction between weeding intervals and cropping systems found significant, a combination of one row mungbean intercrop in sorghum under weed free till 30 days condition had given optimum results. Where as weed free till 45 days was essential to get optimum yield from sole crop of sorghum From these results it can be concluded that by taking one row mungbean intercrop in between two rows of sorghum crop, for getting optimum yield, the weed free period required for sorghum can be reduced from 45 to 30 days and accordingly the critical period of crop weed competition will be 30 days from sowing.

STUDIES ON THE RELATIVE EFFICIENCY OF TRIAZINE COMPOUNDS, 2, 4-D AND SLOW RELEASE 2, 4-D IN COMPARISON WITH MECHANICAL METHODS OF WEED CONTROL IN HYBRID JOWAR (CSH-1) SORGHUM BICOLOR (LINN) MOENCH

R. H. Borse and U, B Mahajan

Agronomy Division, College of Agriculture Dhule,

A field trial was conducted in kharif 1978 - 79 at Agricultural College farm, Dhule, to study the relative efficiency of triazine compounds, 2. 4-D and slow release 2, 4-D in comparison with mechanical methods of weed control in hybrid Jowar.

Marked increase in production of grain and fodder was obtained in clean cultivation. Amongst herbtcidal treatments pre-emergence Atrazine and simazine in combination with post - emergence 2, 4-D appeared to be very promising in controlling the weeds and increasing the grain and fodder yields.

CHEMICAL CONTROL OF WEEDS IN MIXED CROPS OF SORGHUM AND PULSES

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Sorghum during *Kharif* is usually grown with a mixture of a few pulse crops in Karnataka. Having worked out herbicides for individual *Sorghum* and pulse crops, it was decided to find out the suitable herbicides and their effective concentrations to control weeds and least harmful to main crops. Therefore, Sorghum (*Sorghum bicolor* Moench cv. CSH 5) was sown with three pulse crops viz. redgram (*Cajanus cajan* L. Mill, cv. T. 21) cowpeas (*Vigna catjang* Walp. cv.c. 152) and field bean (*Dolichos lablab*. cv. Hebbal Avare) on three row basis in each plot. Four herbicides viz. tertubtryne, prometryne ametryne and alachlor with three dosages each were compared with weed free check, hoeing (two times), unweeded check and an odd treatment of terbutryne (0 . 25 kg ha) plus one hand weeding after 40 days after sowing. All the herbicides were applied as pre-emergence spray, one day after sowing. Experimental design was the split plot one with three replications, main plots were of herbicides, subplots were dosages and sub-sub plots were different crops.

Observations on precentage of germination, height, dry matter accumalation, grain yield, straw yield, 1000 grain weight, dry weed weight have all helped to conclude that pre-emergence application of terbutryne at the rate of 0 . 50 kg a. i. per hectare will help not only to control weeds efficiently in sorghum but also in redgram without affecting them while cowpeas and field beans were injured.

SIGNIFICANCE OF SIMAZINE ON WEED CONTROL IN MAIZE (*ZEA MAYS* L. VAR. GANGA SAFED-2)

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A pot-culture experiment was conducted to evaluate the effect of pre-emergence application of four levels of Simazine i. e , 1, 2, 3 and 4 kg/ha on

the weed control efficiency, leaf area at flowering and yield in maize (*Zea mays* L var. Ganga Safed–2).

Simazine @ 2 kg/ha was effective in conrolling the weeds and raising the grain yields in addition to increasing 'source' size (leaf area). Weed control efficiency increased with increasing levels of Simazine.

The inhibitory effects of Simazine on weed plants appear to be related with an inhibition of enzymatic activities at cellular level.

INVESTIGATIONS ON ECONOMISING NITROGEN FERTILIZATION IN MAIZE THROUGH CHEMICAL WEED CONTROL

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Studies were carried out with maize cultivar Ganga - 5 during the *kharif* seasons of 1975 and 1976 at the Research Farm of the Indian Agricultural Research Institute, New Delhi, involving combinations of dlfferential nitrogen fertilizer treatments and weed control for exploring the possibility of echnomising nitrogen fertilization by controlling weed growth through a pre-emergence application of alachlor.

The highest grain yield was obtained with 120 kg N / ha which wes significantly superior over 40 and 80 kg N/ha. Likewise 80 kg N ha raised the grain production to a significantly higher level to that of 40 kgN/ha Among the weed control treatments, maximum grain yield was secured under alachlor pre-emergence application at 2L/ha elosely followed by hand weeding twice treatment

The grain yield stover yield data revealed that even under no nitrogen the yield was signifieantly increased due to weed control measures as compared to weedy check treatment These data explored the possibility of using lower dose of nitogen without sarcificing the yield, provided the weeds are taken care of by either pra-emergence applicatien cf alachlor at 2L/ha or two hand weedings, 20 and 40 days after sowing.

CHEMICAL WEED CONTROL IN MAIZE + URD INTERCROPPING

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The field studies made in the sandy loam soil of Central U. P. at Kanpur to findout the most economical dose of ToKE - 25 and lasso for the control of weeds in maize + Urd companion cropping system It was revealed that lasso and ToKE - 25 both provided satisfactory control of most annual weeds except cyperus retunds and cynodan dactylon when used at optimum concentration i. e 2 litre/ha lasso, and 4 lit. / ha ToKE-25. Lasso being cheaper In rate and smaller in quantity proved to be most economical than ToKE - 25. It is worth while to mention here that higher concentration of both the herbicides (4 to 5 lit/ha of lasso), (6-7 lit/ha of ToKE - 25 showed phytoxic effect on both the crop of sequence particularly at early stage of growrh.

RESPONSE OF N AT VARYING LEVELS OF SIMAZINE WITH OR WITHOUT INTER CULTIVATION IN MAIZE

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Department of Agronomy, C S Azad University of Agriculture and Technology Kanpur — 208002.

The present study was undertaken in the sandy loam soil of Central U. P. at Kanpur on Maize (Zea mays L) during *Kharif* 78 to findout the interaction between doses of simazine and nitrogen and to see the role of inter-cultivation in maize even under satisfactory control of weeds by simazine - a well known herbicide. The experimental treatments comprised of the doses of nitrogen@ 0, 45 and 90 kg N/ha, simazine @ 1 and 2 kg ai/ha with and without hoeing after one month of sowing. No interaction was observed between nitrogen doses and simazine concentration but a definite role of hoeing in maize was established in increasing in its yield. The maximum yield was obtained by the combination of 45 kg N/ha + 1 kg simazine followed by one hoeing.

STUDIES ON DIRECT HERBICIDAL, SELECTIVE AND RESIDUAL TOXIC EFFECTS OF HERBICIDES IN CROP ROTATIONS -- MAIZE IN *KHARIF* FOLLOWED BY LEGUMES (PEAS, GRAM AND LENTIL IN *RABI*)

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An experiment started in Kharif 1975-76 and continued for three years involved a study of the herbicidal efficiency of atrazine and alachlor (lasso) on maize (cv. Ganga 5) and residual toxic effects of these herbicides made to maize in kharif on legumes (peas, gram and lentil) in rabi season. The weed control treatments given to maize were : unweeded check, hand weeding, there levels of atrazine (1, 2 and 4 kg/ha) and three levels of lasso (1, 2 and 4 L/ha) as pre-em.

The experiment was started with 8 replications. In 1975 kharif, weed control treatments were applied to maize in all the eight replications. In 1976 kharif, weed control treatments were appied to maize in 4 replications only. In the other four replications, no weed control treatments were given. in the rabi season peas, gram and lentil were sown in each plot after maize harvest.

All the weed control treatments improved the grain yield of maize significantly over the unweeded check. The two levels of atrazine (2 and 4 kg/ha) and all the three levels of lasso (1, 2 and 4 L/ha) maintained the grain yield in level with hand-weeding.

All the weed control treatments brought down the dry matter accumulation in weeds significantly over the weedy check.

The grain yield of all the three pulses (peas, gram and lentil) raised in rabi did not differ statistically due to herbicide application made to maize in kharif, thereby indicating the absence of any toxic build up of resldues to affect grain production of the subsequent pulses in rotation.

NOTE ON THE EFFECT OF INTER-CROPPING ON WEED CONTROL AND YIELD OF MAIZE

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Intercropping of groundnut, mung, black gram and soybean with maize were found to be successful.

Maximum grain yield of maize was obtained in pure maize plot treated with Simazine @ 1.5 kg a. i. / ha. Pure maize plot with cultural practice of weeding was next in order. The maize grain yield in intercropped treatments (M/groundnut, M/mung, M/black gram and M/soyaben) were at par with that of pure maize plot that received cultural practice of weeding. Inter crops checked the weed emergence and weed growth by shading effect. Among the intercrop treatments the maize yield was maximum in maize + black gram treatment.

The yield reductions due to un - checked weed competition was to the tune ef 45 . 8%.

DIRECT AND RESIDUAL EFFECTS OF HERBICIDES, IN MAIZE-WHEAT CROP SEQUENCE.

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Field experiment was conducted at Agronomic Research Centre under Punjabrao Krishi Vidyapeeth. Akola during 1972-73 to 1974-75 to study the relative efficiency of different herbicides to control weeds in maize and also study their residual effects on the succeeding crop of wheat. The efficiency of simazine and atrazine at 0 . 5 kg a. i/ha applied immediately after sowing, lasso (alachlor) at 1 . 0 kg a. i/ha as pre emergence alone and in combination with 0 . 5 kg a. i/ha, amine salt of 2,4-D, 4 weeks after sowing, simazine and atrazine each at 1 . 0 kg a. i/ha and diuron at 0 . 5 kg a i/ha were tested against unweeded and manually weeded (weed free and 2 hand weeding) checks.

The results indicated that all the tested herbicides i. e. simazine atrazine, lasso and diuron had signilicant effect on the grain yield of maize over unweeded control. Simazine, atrazine and lasso at 1 . 00 kg a. i/ha applied immediately after sowing were found to be at par with manual weeding However, a combination of simazine or atrazine each at 0 . 5 kg a. i/ha immediately after sowing and 2 4-D amine salt at 4 weeks after sowing were found to be slightly better and quite effective as an alternative to simazine or atrazine at 1.0 kg a. i/ ha, in controlling weeds in maize and also did not produce any adverse residual effect on the yield of succeeding crop of wheat. Repeated hand weeding, simazine, and atrazine 0.5 kg a. i/ha plus 0.5 kg a. i /ha amine salt gave 100, 100 and 109 percent more yield than unweeded control (16 · 52 Q/ha)

All the herbicides reduced the weed population as compared to unweeded control. Dry weed weights recorded at harvest were lowest in plots treated with simazine and atrazine at 0,5 kg a. i/ha plus 0·5 kg a i/ha amine salt of 2,4-D after 4 weeks from sowing Weed intensity in wheat following maize was less.

EVALUATION OF HERBICIDES FOR WEED CONTROL IN SORGHUM

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An experiment was conducted with a object to find out suitable herbicide in comparison with cultural practices in controlling weeds in sorghum crop at College Farm. Marathwada Agricultural University, Parbhani on medium black cotton soils during *kharif*, 1971.

Results indicated that two sprays of 2, 4--D ester (three and six weeks after sowing) are as effective as weeding and hoeing in checking both weed flora and dry matter of weeds in sorghum fields. Further, it has been also observed that, weed index was lowest in the herbicidal treatment (two eprays of 2, 4-D ester threed and six weeks after sowing).

FEASIBILITY OF CHEMICAL WEED CONTROL IN MULTIPLE FORAGE CROPPING SYSTEM OF BAJRA (P. TYPHOIDES) — COWPEA (V.SINENSIS) — OAT + PEAS (ASATIVA ± P. SATIVUM)

R, K. Pandy, Fatesh Singh and S D. Gupta
Indian Grassland & Fodder Research Institute, Jhansi.

The experiment was conduted on medium soil at I. G. F. R. I., Jhansi from 1676 - 78. All combinations of pre-emergence atrazine at 0.5 kg / ha in bajra (rainfed) and pre planting trifluralin at 0.5 kg/ha in cowpea (ralnfed) and pre-emergence Linuron at 0 5 kg/ha in oat + peas (irrigated) with their respective weedy checks were studied in four time replicated randomised block design. Treatments of atrazine and linuron reduced the intensity of annual weeds effectivity in their respective crops and promoted dry matter yield of bajra in first year and oat + peas in second year significantly over weedy check. Non-significant response of weed control treatments showing merely the increasing trend in the yield of these crops might be attributed to the less weed infestation. The intermediate crop of cowpea did not suffer from weed infestation as such no utility of trifluralin treatment was recorded Chemical treatment applied in either one of the crops or first two or last two or first and thlrd or all the three crops of the system appeared non harmful for crop production In order to avoid plant mortality in oat, first irrigation was required to be given after three-weeks of the sowing.

SESSION - V

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Papers on Weed Control

in

Sugarcane, Tea, Banana, Potato,

Tomato, Onion & Vegetable crops.

STUDIES ON THE CRITICAL PERIOD OF WEED CONTROL IN SPRING PLANTED SUGARCANE

Govindra Singh, P C. Pant and V. M, Bhan
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On an average, weeds reduced cane yield by 67.2 per cent. There was no reduction in the cane yield where the weeds infested the fields for the first 30 days only. Weed infestation after 30 days of planting caused significant reduction in the cane yields, weed-free condition maintained beyond 120 days after planting did not increase cane yields significantly. It indicates that the critical period of weed control lies between 30 and 120 days after planting in spring planted sugarcane.

WEED MANAGEMENT IN ADSALI SUGARCANE - CO - 740

J. D. Chougule and B. R. Patil

Field experiments were conducted for two seasons (1971-73 and 1972-74) for management of weeds with different methods in *adsali* sugarcane Variety CO - 740 at Maharashtra Sugarcane Farm, Tilaknagar (Maharashtra). The treatments consisted of preemergence applications of Atrataf, 2, 4-D (Na-salt), Bladex-G + Karmex and hand weeding compared with control (no weeding). The tiller count and the weight of milleable cane and yield of cane was increased due to hand weeding followed by use of Bladex-G + Karmex. The net profit was almost the same due to hand weeding and Bladex-G + Karmex and Atrataf.

HERBICIDE PROTECTANTS FOR SUGARCANE

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A field experiment was carried out on clay loam soils of Agricultural College Farm during the year, 1978 on Sugarcane variety Co-740 in split plot design with 3 replications, with a objective of reducing the adverse effects of high doses of herbicides applied as pre-emergent sprays on early growth of the cane plant, by using the crop protectants-FYM and charcoal.

Generally, the germination percent and the average plant height (at 8th week) were higher in the plots where crop protectants were used. Among the herbicides used. (simazine @ 3.75 kg/ha (a. i.) and 2, 4-D @ 5.0 kg/ha (a.i.) were effective in control of most of the weeds but had adverse effect on germination and plant height. The crop protectant FYM was observed to be better, than charcoal in minimising the adverse effect of herbicides on early growth of sugarcane.

" STUDIES ON WEED CONTROL IN SUGARCANE "

A. D. Karve and Narendra Zende

Nimbkar Agricultural Research Institute, Phaltan.

A field trial to study the efficacy of various weedicides in comparison to normal hand weeding was conducted at Nimbkar Agricultural Research Institute, Phaltan, in black cotton soil during the monsoon of 1974 - 75 and 1977-78. The chemicals tried were ASULOX 40, slow release 2, 4 - D dust formulation from National Chemical Laboratory, 2, 4-D ester and ACTRIL DS.

The weed species observed in the trials were as follows :

Parthenium hysterophorus, Argemone maxicana, Convolvulus arvensis, Corchores trilocularis, Aristolochia bracteata, Alysicarpus sp., *phyllanthus* spp , *Euphorbia hirta, Striga lutea, Leucas aspera, Celosia argentia, Rungia repens, Xanthium strumarium, Tribullus terrestris, Tridax procumbens Lactuca runcinata, Amaranthus viridis, Portulaca oleracea, Digera arvensis,* A member of Euphorbiaceae, *Panicum repens, Echinochloa colonum, Cynodon dactylon*

Results presented in the tables show that chemical treatments ASULOX 40 + 2, 4 - D ester and ASULOX 40 + ACTRIL DS were quite comparable to the hand weeded control (fortnightly hand weeding).

INTEGRATD WEED CONTROL IN TEA

V. S. Rao
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The most effective approach for integrated system of weed control in a crop should be to evolve the highly effective and least expensive weed control schedules that do not disturb the ecological and environmental balance. As herbicides and human labour are becoming increasingly expensive, there is a greater need to economize weed control practices for financial and environmental reasons. Weed research programme at Tocklai is directed to meet this objective. The results of various experiments on time and duration of weed competition, heribicide selectivity, weed succession, herbicide mixtures, sequential application of herbicides, new herbicides, surfactants and fertilizer additives, herbicide persistence. spraying techniques, manual weed control, economic evaluation of weed control practices, are presented and discussed.

EFFECT OF PARAQUAT-MSMA AND PARAQUAT-RH-2915 MIXTURES IN THE CONTROL OF PERENNIAL GRASSES IN TEA.

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Paraquat (1,1'-dimethyl-4,4' bipyridinium ion), a contact herbicide, can only burn the above ground parts of perennial weeds. This normally results in quick regeneration of the unaffected underground plant parts within 3 to 6 weeks and necessitating several repetitive paraquat applications in a year thus increasing the total cost of weed control Several pot and field experiments were conducted to study the effect of tank mixing of MSMA (monosodium methanearsouate) at 0.50 and 1 0 kg/ha or oxyfluorfen (RH-2915) (2-chloro-1--(3-ethoxy-4-nitrophenoxyl)-4-(trifluoromethyl) benzene at 0 38 and 0.75 kg/ha with paraquat at 0 15 and 0 30 kg/ha on the control of *Paspalum conjugatum*, *Setaria palmifolia*, and *Cynodon dactylon*, the very persistent perennial grass weede in tea.

When paraquat (0.15 kg/ha)-MSMA (0,50 kg/ha) mixture was applied at postemergence on *Paspalum*, regrowth was considerably delayed and the final

weed control was significantly superior to that when paraquat was applied alone. Similar results were also obtained when paraquat (0.15 kg/ha) and RH-2915 (0.75 kg/ha) were tank mixed and sprayed on *Setaria*. While neither MSMA nor RH-2915 alone had any effect on *Cynodon*, they showed moderate activity on *Paspalum* and *Setaria* respectively. As the effect paraquat–RH-2915 combination on Setaria is significantly higher than the combined effect of each of them applied alone, these two herbicides are possibly acting synergistically.

INTERGRATED WEED CONTROL IN THE TEA PLANTATION OF DARJEELING DISTRICT

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Use of herbicides was taboo until recently in Darjeeling tea on the apprehension of deluge by soil wash. Successful use of chemicals in other hilly tea areas to control weeds was viewed with suspision. Manual weed control practiced is in fact not to alliviate the competition - it is mainly to overcome the mechanical obstruction by the over grown weeds to the nomral field operations. This was carried-out by the sickling the stumps a few cm. above the soil level. During the winter throgh hand cleaning out is the normal ptactice involving large labour force. Herbicides use had gone up by 30 times in the last 3 years from 100 ha. to 3000 ha. covering 16% of the tolal tea area. Timely control of weeds by paraquat and 2, 4-D with additives 2 or 3 times a year keeps the weeds under control Use of Dalapon to control deep rooted grass is practised selectively.

Mechanical or manual could not be altogether stopped. The problem weed like Mikaria, Ipomea, Pteridophytes. Drymaria and other hardy perennials have to be tackled manually. This work is being carried-out during winter when the labour force is easily available

Use of preemergent herbicides in the collar region of the bushes where the damages of drift is high is recommended. After the bushes are pruned, application of Simazine or Diuron compounds following a thorogh hand cleaning out, keeps the weeds under check till new growth has come up sufficiently. The new growth of tea due to shade effect reduces drastically the germination of weeds in the lower region. Thus this problem of hand collection of weeds growing through the bushes is minimised,

The growth and intensity of perennial weeds esp. grasses is also checked by thick mulching The epiphytic growth of mosses and lichens at the collar and on the branches are controlled by use of Alkaline sprays or other chemical. This is carried - out once in 3 to 5 years after pruning.

Continous use of herbicides leads to moss growth on the soil resulting usually in thin crest formation which is likely to interfere with aeration. This needs naeking up periodically. The total inputs of chemical/manual taken in two different locations are discussed.

CHEMICAL CONTROL OF THATCH (*IMPERATA CYLINDRICA* BEAUV.) IN NEW CLEARINGS AND YOUNG TEA PLANTATIONS OF HIMACHAL PRADESH

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The thatch, Cogon or Chhij (*Imperata cylindrica*) was controlled effectively by weedicidal sprays. Two applications of dalapon (Sodium salt of 2,2-dichloro-propionic acid) @ 1.5 kg/ha in May and August, 1977 resulted in 78 65, 78.51 and 95 89 per cent reduction in weed population, shoot growth and dry weight of weed resepectively Two applications of any of the three higher doses viz. 3.0, 4 5 and 6 0 kg/ha were not found to be significantly different than the lowest effective dose although the control on population basis further increased to 87.05, 87 88 and 88.56 per-cent, respectively. The Gramoxone (1,1-dimethyl-4,4-bipyri-dylium chloride) applied twice @ 1 . 0 litre or 2 0 litre per hectare proved less effective. Both the weedicides however improved the growth of tea bushes

RESPONSE OF SUNFLOWER TO WEED CONTROL

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The experiment was conducted during Kharif season of 1977 - 78 in a randomized block design. The herbicides viz. Casoron (1kg ai / ha), Nitrofen

(2 kg ai/ha), Gramaxine (2 . 1 ai/ha), Dacthol (4 . 1 ai/ha), Basalin (1·1 ai/ha) and Alachlor (3.1 ai/ha), were compared with hand weeding and no weeding treatments. Basalin was applied as pre-plant incorporated, Alachlor, Casoron Nitrofen. Dacthol were applied as pre-emergence and Gramaxone was applied post-directed (30 DAS). The weed counts recorded within the row showed the highest count under no weeding and lowest under hand weeding treatments. The observations recorded on stem diameter test weight, seed yield, and oil percentage did not differ significantly under different weed control treatments However. the highest stem diameter was recorded under casoron and lowest under hand weeding and no weeding treatments.

WEED CONTROL STUDIES IN SUNFLOWER (*HELIANTHUS ANNUS* L)

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Alachlor, methabenzthiazuron, fluchloralin and terbutryn at 3 levels each applied to the spring crop of Sunflower showed that the herbicides had no adverse effect on emergence of seedlings and significantly reduced the weed dry matter In comparison to methabenzthiazuron and terbutryn, the herbicides alachlor and fluchloral in increased significantly the seed number and weight/flower head, test weight and number of seeds/unit volume. All the herbicides resulted in significantly higher yield than the unweeded control (9·8 q/ha). Alachlor, fluchloralin and hand weeding. with seed yields of 16·72, 16·07 and 16·18 q/ha respectively, were superior to terbutryn (11·72 q/ha) and methabenzthiazuron (11·62 q/ha). Maximum yield of 19 · 32 q/ha, however, was obtained with alachlor applied @ 1.25 L ai/ha as pre-emergence spray. Per cent oil content was not affeced by any of the treatment.

THE EFFECT OF SOME PRE-PLANT AND POST-EMERGENCE HERBICIDES ON WEED FLORA IN ONION

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Investigations were carried out at three different locations i, e. Vegetable Research Station, PAU, Ludhiana, Govt. Vegetable Farm Beas (Amritsar) and

at Farmers' Fields at V. Kaunta (Gurdaspur) during the year 1976-77 and 1977-78. The post-emergence application of stam F - 34 at 1 · 02 kg and 1 · 36 kg a. i /ha exhibited phytotoxic effect on the onion seedlings which was expressed through yellowing and burning of tips of leaves. Ronstar at 3 · 00 kg a. i. /ha also exhibited slight tip burning of leaves, but this effect was recovered in 15-20 days. Basalin at 0 . 90 and 1 · 20 kg a. i. /ha (pre-plant) controlled all the weeds except *Medicago denticulata, Trigonella polycerata, Conyza strilta* and *Cyperus rotundus,* the small numbers of which appled after one and half month of showing of crop Ronstar at 2 · 00 and 3 · 00 kg a. i /ha (post-em) were also effective against all weeds except *Eragrostis pilosa* and *Cyperus rotundus,* Both the doses of Basalin and Ronstar gave the higher weed control efficiency by significantly lowering rhe weed population and fresh and dry weight accumulation of weeds.

CHEMICAL WEED CONTROL IN CABBAGE - ONION RELAY

V. S. Mani, N. T. Yaduraju and Mrs. Gita Kulshrestha and Bhagwandas

Field experiments have been conducted for assessing the direct herbicidal and selective effects of some soil - applied herbicides in cabbage (cv, Golden Acre) The residual effects of these were studied on onion (Pusa) raised es a relay.

Treflan, basalin, desmetryne and nitrofen proved effective in securing selective weed control in cabbage as a consequence of which a substantial enhancement in head production of the crop resulted. Of these chemicals, the persistence of treflan, basalin and desmetryne was found to eurb weed growth in onion grown as a relay in the standing cabbage. thus leading to significant improvement in onion bulb production.

CROP-WEED COMPETITION IN TOMATO

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The crop-weed competition is a complex phenomenon determined by varied situation of environment Weed control methods including chemical weed control depend on the critical weed-free period of a crop and hence there is the need to evaluate the crop-weed competition in tomato

'Crop-weed competition' in tomato (Co . 1) was laid out in monsoon seasons of 1975 and 1976. There were seven treatments besides unweeded control as follows. Weed free for 15 days (W_1), 30 days (W_2), 45 days (W_3), 60 days (W_4), weed free for 75 days (W_5) hand hoeing on 15 th and 45 th day and earthing up on 30 th day (Farmers' method-W_6), hand hoeing on 15 th, 30 th and 45 th day (W_7).

Weed flora of the experimental area comprised mainly of dicotyledonous annuals and seed germinating grasses. *Trianthema portulacastrum* L. and *Dactyloctenium aegyptium* Beauv. were the most important species in terms of weed infestation. The only perennial weed was *Cyperus rotundus* L. which occured in minimum number. Weeds smothered tomato crop under unweeded control and almost smothering under weed free condition for 15 days. There was effective weed control under weed free condition for 30 days and above. The yield of marketable fruits was significantly reduced under unweeded control (W_0) and freedom from weeds for 15 days (W_1). The data on the merketable fruit yield/ha revealed that during 1975 the treatment w_3 gave highest yield of 39 . 7 t/ha followed by w_4 (36,7 t) and w_7 (36 · 4 t) which were on par. The treatment w_3, w_6 and w_2 gave yields in the order of 35.1, 33·5 and 32·9 t/ha, The treatments w_1 and w_0 recorded yields of 19.4 and 12.4 t/ha respectively. The yield of w_1 and w_0 was significantly lower than the rest of the treatments. In 1976 also. a similar trend was maintained. The treatments w_7, w_5. w_3, w_6, w_4 and w_2 gave yield in the order of 30.1, 29.9 29.9, 29.4, 29.4 and 28.4 t/ha which were comparable. The treatments w_1 and w_0 recorded significantly lower yield of 18·6 and 16.8 t/ha respectively. In was found that the critical weed free period for tomato was upto 30 days from transplanting under a spacing of 60 x 45 cm out of a crop duration of 105 days from sowing and 80 to 90 days from transplanting.

SELECTIVITY AND WEED CONTROL EFFICIENCY OF HERBICIDES IN TOMATO

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Tomato is an important vegetable crop from the point of view of nutrition and is being grown extensively in India. The growth and yield of tomato crop are confronted by many weeds of both annuals and perennials. The present study was programmed and undertaken with two herbicides namely alachlor and metribuzin, their mixture in tomato (Var. Co. 1).

There were three levels of metribuzin (0.5, 1.25, 2.0 kg/ha), one level of alachlor (2.0 kg), combination of alachlor 2.0 kg (pre - emergence) plus metribuzin 0 . 5 kg (early post emergence) in monsoon 1975 and 1976. Farmers method and unweeded contol were maintained. The results showed that metribuzin 0.5 kg/ha gave seasonlong weed control with a light weedy stand at the harvesting stage in monsoon season. Higher levels of metribuzin at 1.25 and 2.0 kg/ha gave effective weed control with pytotoxicity to tomato crop. Alachlor 2.0 kg/ha gave short term weed control. Metribuzin 0 5, 1.25, 2·0 alachlor 2.0 kg, alachlor 2.0 plus metribuzin 0.5 kg recorded marketable fruits in the order 38 . 1, 27 . 1, 18 . 8, 34 . 7, 34 . 4 t / ha as compared to 37 . 1 t/ha farmers method in1975 In the year 1976 also the yield of marketable fruits was highest for farmers' method (30 t/ha) followed by metribuzin 0 . 5 kg (27 . 3 t), alachlor 2 . 0 kg plus metribuzin (26 . 5t), alachlor 2 . 0 kg (20 . 6 t), metribuzin 1 . 25 kg (19 . 0 t), 2 . 0 kg (14 . 7 t). The treatment of farmers method (hand hoeing followed by earthing up followed by hand hoeing) gave an yield of 30 . 0 t/ha. The yield reduction at the higher levels of metribuzin is attributed to phytotoxicity, resulted stand reduction and yield reduction. Metribuzin 0 . 5 kg was found to be selective for tomato and alachlor (2 0 kg) plus metribuzin (0 . 5 kg) was useful for weed control in monsoon season.

CHEMICAL WEED CONTROL IN RELATION TO CULTURAL SYSTEMS IN TOMATO

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Kumaraperumal Farm Science Centre, TNAU. Tiruchi - 9

In tomato, normally weed control adopted by farmers includes two hand hoeings in the first and third forrtnights after trancplanting In the second fort. night, soil is earthed up as an important interculture to the crop. Besides destruction of weeds, it confers certain advantages like aeration of soil which promotes nitrification, action of soil bacteria and root pruning contributing to increased branching and higher yields The use of herbicides for weed control has necessitated a reassessment of cultural practices like hand hoeing and earthing up in the context of chemical weed control In the monsoon season of 1975 and 1976 a study was undertaken to evaluate the need of cultural practices along with herbicides with the following treatments : metribuzin 0 . 5 kg. alachlor 2 . 0 kg, alachlor 2 . 0 kg plus metribuzin 0 5 kg, combination of these treatment with hand hoeing, earthing up, farmers methods, three hand hoeing and unweeded control.

The data on weed dry matter showed that combination of hand hoeing for alachlor was highly useful to bring down the weed dry weight from higher level to a minimum level. Similarly earthing also reduced the dry weight of weeds significantly under alachlor application. The yield of marketable fruits was signif cantly influenced only under alachlor treatment. There was no significant difference between metribuzine 0 5 kg along and combining with hand hoeing and earthing. Similarly the yield of marketable fruits under farmers method and three hand hoeings were comparable. The yield was significantly reduced under alachlor alone and unweeded control. The combination of pre-emergence alachlor followed by early post emergence metribuzin gave significantly higher yield than alachlor, but equal to that of metribuzin 0 5 kg/ha It is concluded that combining hand hoeing or earthing up over and above the chemical weed control was useful only for alachlor (2 0 kg/ha) due to loss of persistence. Earthing up or hand hoeing following the metribuzin 0 , 5 kg neither conferred any additional advantage nor was harmful to the early weed control accomplished with herbicides except eliminating the light weedv stand at the hervesting stage.

A STUDY ON THE COMPARATIVE EFFICACY OF PRE AND POST EMERGENT APPLICATION OF HERBICIDES IN CONTROLLING WEEDS IN BANANA

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A trial was laid out at Banana Research Station, Kannara during 1976-77 season to compare the superiority of the pre and post emergence application of herbicides in controlling weeds in banana plantations in Randomized Block Design. The treatments were (a) Diuron 4 kg/ha at bi - monthly intervals as pre-emergence spray and (b) Gramaxone 1·5 lit. / ha. + Diruon 3 kg / ha. (c) Gramaxone 1.5 lit / ha + 2, 4-D. Na salt 3 kg/ha. as post emergence spray at 6 monthly intervals. Dry weights of weeds sampled from one square metre plots at three different occassions were used as the measure of comparision in assessing the efficacy of the treatments. The results indicate that there was no significant difference between treatments. In other words under Trichur conditions a broad spectrum of weeds in banana plantations can be effectively controlled either by a pre emergence application of Diuron 3 kg / ha. at bi-monthly intervals or by post - emergence application with Gramaxone 1 5 lit. + Diuron 3 kg / ha. or Gramaxone 1.5 lit + 2, 4-D. Na salt 3 kg / ha post emergence application. Considering the economics of application of Gramaxone 1.5 lit + 2, 4 - D 3 kg / ha. is more economical than the other two treatments.

A STUDY OF THE DIRECT HERBICIDAL, SELECTIVE AND RESIDUAL EFFECTS OF HERBICIDES IN A RELAY CROPPING SYSTEM OF POTATO AND WHEAT

V. S. Mani, N. T. Yaduraju, Mrs. Gita, Kulshrestha and Bhagwandas

Field experiments have been in progress for studying the effect of pre-emergence application of herbicides in potato (cv. Chandramukhi) on weed control and tuber production and residual toxic effects of these on wheat (cv. Sonalika) raised as a relay in the standing potato crop.

Herbicides tested for two years were nitrofen and alachlor separately at 2 L/ha each, fluchloralin (1 L/ha) and 0 . 5 kg each of linuron, metabuomoron

and metribuzin. All the herbicides increased the potato yields significantly over unweeded control in both years Nitrofen (292 q/ha), metribuzin (317 q/ha) and fluchloralin (363 q/ha) gave higher yields than hand-weeding (287 q/ha) in 1976-77. However in 1977-78 only metribuzin (264 q/ha). recorded more yield than hand-weeding (253 q/ha) unweeded control yielded 237 and 178 q/ha in 1976-77 and 1977-78 respectively.

Wheat yields as relay differed significantly in the first year but there was no significant difference in the second year. Grain yield of wheat in fluchloralin (basalin) was depressed in 1976-77 only, but not in the next season An irrigation immediately after wheat seed sowing in 1977-78 probably leached down the residues of basalin.

RESIDUAL EFFECT OF WEEDICIDES ON FODDER MAIZE AND WHEAT GROWN IN ROTATION WITH POTATO

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Crops follow each other in quick succession under the multiple cropping systems. The herbicides, now extensively used in potato culture in Punjab for controlling weeds could affect the succeeding crops in rotation An experiment was therefore conducted at C. P. R. S. Jullundur (Punjab) to study the residual toxicity, if any, of herbicides. The experimental crop of potato grown in spring 1974 was immediately followed by maize fodder in summer 1974 and that grown in autumn 1974, by wheat in spring 1975 The experiment contsisted of 16 treatments, viz. EPTC @ 3-75 kg a. i./ha pre-pl , fluchloralin @ 1.20 kg a. i./ha pre-em , alachlor @ 2.50 kg a. i./ha pre-em., nitrofen @ 1.25 kg a i./ha pre-em., sirmate @ 2.25 kg a. i /ha pre-em , simazine @ 0,25 kg a i. /ha pre em., linuron @ 0.25 kg a i./ha pre-em., metobromuron @1.25 kg a. i. /ha pre-em , methabenzthiazuron @ 0.70 kg a. i./ha pre-em., 2,4-D @ 1.00 kg a. i./ha pre-em , alachlor + nitrofen @1.25 + 0 62kg a. i /ha respectively pre-em., alachlor and 2 4-D at @ 1.25 and 0.50 kg a. i /ha respectively pre-em., propanil @ 0.87 kg a. i./ha post em.. alachlor (pre-em) and propanil post-em.) @1.25 and 0 87 kg a. i./ha applied in succession cultural (hand weeding followed by earthing) and untreated control replicated four times.

Simazine, applied in potato reduced the straw weight significantly and grain weight to some extent of succeeding crop of wheat while no adverse effect was noticed on maize grown as fodder in rotation.

STUDIES ON THE EFFECT OF PRE-PLANT AND PRE-EMERGENCE HERBICIDES IN COMBINATION WITH CULTURAL PRACTICES ON THE WEED FLORA ON OKRA (*ABELMOSCHUS ESCULENTUS* L. MOENCH)

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Different pre-plant and pre-emergence herbicides were tried in combination with manual weeding at three different locations i. e at Vegetable Research Station, Pb Agricultural University. Ludhiana Govt, Vegetable Farm Beas (Amritsar) and Govt. Vegetable Farm, Gurdaspur during the year 1976-77 and 1977-78. Basalin at 1·20 and 0·90 kg a. i /ha + one hoeing and Lasso at 2.50 kg a i /ha + one hoeing controlled all the monocot and dicot weeds except small numbers of *Cyperus rotundus*, *Tribullus terrestris* and *Eleusine aegyptiacum* which appeared at later stages of crop growth. Both, Basalin at 0.90 and 1 20 kg a. i./ha + one weeding and Lasso at 2·50 kg a. i,/ha + one weeding gave higher weed control efficiency by significatr ly lowering the weed population and fresh and dry weight accumulation of weeds. No herbicide imparted any phytotoxic effect on the crop.

INTERGRATED WEED CONTROL UNDER RAINFED CONDITION IN FINGERMILLET

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Weed competition in early stages of crop growth vitally affects the yield potential of any crop and fingermillet is no exception to this. Since fingermillet is largely growing as a rainfed crop, the weeds rob the limited moisture owing to their high transpiration rate Besides, the weeds compete with the crop for the nutrients which calls for an effective weed control in this crop.

The experiment was conducted during the kharif season of 1977 - 78 in the Agronomy field unit at M. R. S., Hebbal, Bangalore. The treatments included were pre - emergence application of Neburon at the rate of 0.5 kg / ha, 1.0 kg/ha and 1.5 kg / ha, 2-4-D 0.5 kg/ha, 1.0 kg / ha, 1.5 kg / ha. The post-emergence application of Neburon 0.5 kg/ha, 1.0 kg/ha, and 1.5 kg/ha; 2-4-D 0 5 kg/ha, 1.0 kg/ha, 1 5 kg/ha. Besides the combination of herbicides with handweeding treatments were also included. A weedy check plot was there to compare the efficiency of weed control. The results have indicated that pre - emergence application of Neburon at 1.0 kg/ha with 2 handweedings at 15th and 30th day after sowing was the best treatment followed by post-emergence application of 2, 4-D 1.0 kg/ha with 2 handweedings 20th day and 40th day after sowing.

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Papers on Weed Control

in

Jute, Cotton, Groundnut,

& Acquatic weeds.

CHEMICAL AND MECHANICAL WEED CONTROL IN COTTON

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A field trial was conducted during 1973-74 to study the effect of different herbicides and cultural practices on the weed control in Cotton The results revealed that the three hand weedings and interculture treatment has recorded significantly higher seed cotton yield over herbicides and the control. Among the herbicides the application of diuron @ 0 . 75 kg a. i /ha as pre - emergence and Diuron @ 0 . 50 kg a. i./ha as post-emergence and Ansar @ 5 . 00 L/ha as post-emergence spray have produced higher seed cotton yield over all herbicides and the control

EFFECTS OF CERTAIN HERBICIDES AND CULTURAL METHODS ON CONTROL OF WEEDS AND YIELD OF RAINFED COTTON
(*GOSSYPIUM HIRSUTUM* L.)

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A field experiment was conducted during 1973-74 and 1975-76 to compare the efficiency of different herbicides viz. Tok E 25 (3–125 and 6-251 ai/ha); diuron (0 . 6 and 1 . 2 kg a.i,/ha); cotoran (1 . 2 and 2 4 kg a.i,/ha) and Ansar 529 (1 . 74 and 3 48 1 a i,/ha) along with the cultural methods of weed control (Hand weeding, Interculturing and handweeding + interculturing) on cotton under A I. C R. P. on Dryland Agriculture. Anand In case of weed mortality, Tok E 25 appeared significantly superior over the remaining herbicides on 50th day while Ansar 529 on 85th day after sowing the crop in both the years Tok E 25 recorded the average weed control efficiency ranged from 70 . 2 to 93 . 3 percent while Ansar 529 from 59 . 4 to 92 . 7 percent up to harvest of the crop. The weed control efficiency achieved under weeded controls ranged from 74 . 6 to 96 . 0 percent which was comparable with the above two herbicides. Tok E 25 @ 3 . 125 and Ansar 529 @ 1 . 74 la. i /ha gave 3.10 and

3 . 35 q/ha seed cotton yield which is higher by 71 . 3 and 85 . 0 percent over unweeded control with a weed index (W. I.) values of 8 . 8 and 1 . 5 respectively. In respect of yield - these two treatments were as good as weeded controls

From weed control and yield point of view all these three treatments were found promising but considering the economics of the herbicides and cultural methods Ansar 529 @ 1 . 74 la. i./ha as post-emergence gave the highest net return of Rs 390 per ha followed by weeded controls which gave a net return of Rs. 296 per ha.

The present study revealed the use of Ansar 529 @ 1 . 74 la. i./ha for weed control in cotton in the period of acute shortage of labours as well as unfavourable weather and soil condition which is a generally occuring under rainfed condition.

INTEGRATED WEED CONTROL IN COTTON UNDER HARYANA CONDITIONS

M. S. Kairon, V. Singh, D. S. Nehra and Laj Pat Rai

Two sets of experiments were conducted with the objective of studying the effect of weed control in cotton for efficient use of fertilizer at HAU Farm Hissar. In set-I the studies were undertaken on the effect of weed control in relation with nitrogen levels for three years from 1969 to 1971 and it was found that 70% of Nitrogen was removed by weeds The interculture increased the cotton yield by 65 per cent over no weeding. In set II chemical weed control in combination with dry hoeing was compared with normal practices of interculture in cotton & thereby 27 per cent increase in yield was recorded by controlling the weeds with normal interculture or chemical weed control The unweeded check gave the lowest yield and alongwith this the removal of the nutrients was the maximum. Total dry matter production (+ . 690) and total uptake by cotton crop (+ . 851) gave significantly positive correlation with seed cotton yield. Significantly negative correlation were obtained between yield and dry wt of weeds (— . 830). harvest index & total weight of weeds (— . 704), total uptake by cotton & total uptake by weeds (— . 888).

EFFECT OF CROP WEED COMPETITION ON THE NUTRIENT REMOVAL BY WEEDS AND QUALITY OF COTTON VAR MCU -5 UNDER IRRIGATED CONDITIONS

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The effect of crop weed competition in Cotton crop on the nutrient removal by weeds and the quality of cotton was studied in a field experiment for two conaecutive years in 1975-76. The experiment was conducted in a clay loam soil with low available N and P and high available K. The treatments comprised of weed free period upto 10 days to 80 days at 10 days interval, full weed free period and unweeded control. Randomized block design with three replications was adopted and the gross and net plot sizes were 4 50 x 3.60 m and 3.0 x 3.0 m respectively

The result indicated that in unweeded crop a total nutrient removal of 42 . 53, 1 . 97 and 27 . 90 kg / ha of N, P and K by weeds were observed. These quantities were reduced to 13 . 86, 0 . 64 and 7 83 kg/ha of N P and K at 50 days weed free period and further reduced to 3 46, 0 15 and 1 . 91 kg/ha of NPK at 80 days weed free period. Removal of weeds in the early period of crop resulted in increased yield and good quality of cotton. The lint index increased progressively from 5.64 in unweeded control to 6.43 in 50 days weed free periods Seed index was higher 12.49 under 40 days weed free periods. The ginning percentage increased from 31 4 under unweeded control to 34 4 per cent under 50 days weed free period. Bartlett's earliness index was also highest (0.745) under full weed free period. The results indicated the necessity of weed free period for first 40 - 50 days for quality cotton crop.

WEED MANAGEMENT IN H-4 COTTON (*GOSSYPIUM HIRSUTUM* L)

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An experiment was undertaken at central farm and Agricultural College farm Marathwada Agricultural University, Parbhani in *Kharif* seasons of 1975-76 and 1976-77, with six concentrations of Fluchloralin (Basalin 48%) and three times of application along-with three additional treatments viz. Diuron, weeding and interculturing and unweeded control. Statistical analysis of the data revealed that the usual method of weeding and interculturing proved better. However, efficiency achieved even by chemical control with Basalin and Diuron herbicides was also favourable and considerable. Application of Basalin @2.0 to 2.5 l/ha as pre-emergence or presowing or Diuron @ 1.0 kg/ha as pre plus postemergence would be desirable to obtain the increased seed cotton yield. Functional analysis of the data indicated that the application of Basalin above 2.345 l/ha was not advisible. Economic analysis exhibited that the gain in yield and net profit was fairly high at the lowest price ratio and the highest product price indicating the improtance of seed cotton price.

RESIDUAL EFFECT OF PRE-EMERGENCE HERBICIDES, INSECTICIDE AND SUCCINIC ACID ON SUCCEEDING CROPS AFTER COTTON

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The residual effect of four pre-emergence herbicides viz. alachlor at 1.5 ai/ha, fluometuron at 1.0 kg ai/ha, fluchloralin at 1.0 l ai/ha, and dinitramine at 0.48 kg ai/ha, aldicarb insecticide at 1, 0 kg ai/ha, succinic acid at 0.5 kg /ha applied to Cotton, was studied after the harvest of Cotton crop in a field bio-assay technique. Field crops like sorghum, finger millet, foxtail millet, pearl millet, sunflower, green gram and lab lab were raised in each plot in two rows and the residual toxicity was studied by estimating the germination percentege, plant height and dry matter of crop at 40 days. The study was made in two consecutive years i.e 1975 and 1976 immediately after the harvest of Cotton crop at 165 days of duration.

The results indicated that the germination of all the crops sown was not affected. The height of crops showed that only in pearl millet reduced plant height was observed in the plot treated with fluometuron and fluchloralin in the second year alone The dry matter of crops at 40 days was higher in all the herbicides, insecticide and chemical treatments compared to unweeded control. Cotton being a long duration crop of 165 days the herbicides, insecticide and chemicals did not leave any harmful residue to effect the subsequent crops raised after cotton.

RELATIVE EFFECTIVENESS OF CHEMICAL AND CULTURAL METHODS ALONE AND THEIR COMBINATION IN CONTROLLING WEEDS IN JUTE CROP

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An investigation was conducted during kharif season of 1978 at the College of Agriculture Farm, Visva-Bharati University to find out the effectiveness of Basalin, kerb, handweeding, wheelhoeing and their combinations in controlling weeds in jute field. It was revealed that most effective reduction in dry weight of weeds was obtained under Basaline 1·5 liter/ha followed by handweeding, wheelhoeing followed by handweeding and handweeding twice as compared to other treatments As regards yield of jute fibre these treatments were at par and showed higher production than other treatments. Basalin 1·5 and 2·0 l/ha alone were next in order of efficiency in killing weeds as well as producing yield of jute fibre. However, Basalin 2·5 Litre/ha showed reduction in yield which was due to mortality of jute plants at this higher dose. Kerb herbicide, though showed good reduction in dry weight of weeds but the yield was poor due to reduction in jute plant population by the action of this herbicide in this acidic soil (PH 5·5). The application of basalin at 1·5 Litre/ha as pre-emergence (2 days after sowing) followed by handweeding at 30 days after sowing appeared to be the best treatment to control weeds in jute as combined chemical and cultural methods.

INTEGRATED WEED CONTROL IN JUTE

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Conventional control of weed in jute field demands around 180 mandays per hectare between third and fifth week of crop age, which in terms of expenditure constitute one third of total cost of cultivation. Vagaries of weather and paucity of farm hand during this period, often leads to neglecting this important agricultural operation which is, per force, perfunctorily executed.

Following practices reduce labour requirement for weeding while ensure high yield of fibre.

1) Removal of propagating roots and underground stems of weeds through deep ploughing

2) Sowing of jute at a time when moisture content is optimum (to ensure uniform emergence)

3) Requisite spacing denying weeds to cover gap where jute seedlings ought to occupy the space.

4) Use of polythene-lined irrigation channel preventing transport of weed seed to the cropped field

5) Irrigation restricted to the minimum or without it when rains are helpful.

6) Introduction of multiple cropping system such as jute-paddy-potato or jute-paddy-wheat etc that prevent weeds to perennate or multiply. Jute has to be kept weed-free till the foliage forms a continuous canopy usually achieved by sixth week from germination

7) Use of herbicides in a judicious manner.

Recommended technique of controlling jute field weeds with herbicide.

a) Application of tetrapion (TFp-Sodium) at 4 kg a i. per hectare as preplant application and incorporating it in the soil 10 days prior to sowing of jute controls all annual weeds and *Cyperus rotundus* by 30-40 per cent.

b) Post emergence application in row cropped jute. MSMA (Ansar 529) at 4 kg. a. i. per hectare mixed in 800 litres of water, sprayed in between the rows of jute with knapsack sprayer fitted with flood jet nozzle, controls all annual grass and *Cyperus rotundus* but is ineffective against *Cynodon dactylon.*

c) MSMA + DALAPON : One spray of mixture of these two herbicides at 2 kg. a. i. and 2 5 kg. a. i. respectively per hectare, controls all grasses & sedges in cluding *Cynodon dactylon.*

Experimental results show that four years' successive use of tetrapion in jute increased its yield by 2.5 q/ha and there was no residual effect on the next crop. A treatment combination of tetrapion and one hand weed ng operation increased the yield by 4 q/ha compared to chemical application alone. Among the three types of cropping patterns tested in our farm, it was found that the rotation jute-paddy-potato was the most efficient one in controlling weeds; as the potato crop required much tillage cperation it resulted in reduction of weed population in the next crop. The residual nutrients left in potato plots helped to sustain good growth in succeeding jute at a faster rate and fo form a canopy very quickly. It has also been observed that jute plants attaining a height of 1 to 1.2 metre suppressed weeds without further human aid.

CONTROL OF JUTE WEEDS WITH AMIBEN

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A field trial was conducted at Ranchi Agricultural College Farm, Kanke, during two successive seasons 1976 and 1977 to study the efficacy of the herbicide Amiben on the weeds of jute *Capsularis* (JRC 212) and *Olitorius* (JRC 632). The herbicide was applied in the form of pre - plant incorporation in doses of 1. 2, 3 and 4 lit/ha (actual) and as pre-emargence in doses of 2, 3, 4 and 5 lit/ha (actual) There were two checks viz., (i) weeded and (ii) unweeded. The efficacy was evaluated in terms of weed population, dry weight of weeds and seed yield, The weed flora consisted chiefly of : *Echinochloa colonum, Setaria glouca, Brachasia ramosa, Panicum* Sp., *Comelina indica, Comelina benghalenris Dectyloctenium agyptium, Ageratum Conyzoides, Eleusine indica, Cynodon dactylon, Cyperus* Sp. *Disitaria longifolia, Tridax procumbens, Oldonlandia corymbosa.*

The results indicated that the highest dose of 5 lit.ha under both the methods of application was most effective, recording lowest weed population and dry weight of weed and highest seed yields which were at par with those of weeded plots. The average seed yields under pre-plant incorporation were 220 and 128 kg / ha in JRC 212 and 150 and 172 kg / ha in JRO 632 in 1976 and 1977 respectively as against 350 and 133 kg/ha in JRC 212 and 200 and 180 kg/ha in JRO 632 in weeded checks. In case of pre - emergence application the corresponding yields were 190 and 89 kg / ha in JRC 212 and 240 and 160 kg/ha in JRO 632; tho yields in weeded check being 280 and 114 kg/ha in JRC-212 and JRC-620 and 210 kg/ha in JRO-632 in the year 1976 and 1977 respectively.

CONTROL OF AQUATIC WEED THROUGH EFFICIENT USE OF HERBICIDES

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Number of experiments were conducted during 1976-77 to test the efficacy of herbicides and their mixtures at different rates Several herbicides and their mixtures were tried to control cattail (*Typha angustata*) established in trenches several months before spraying in the Aquatic Weed Section of the Research Farm of Haryana Agricultural University, Hissar. For the control of water hyacinth (*Eichornina crassipes*) two set of experiments were conducted during 1976-77 and 1977-1978 and experiment site was an abondened drainage canal heavily infested with water hyacinth in the heart of Hissar city. In the experiment for the control of submerged weeds both chemical and mechanical control treatments were tried in circular pits 1000 litre capacity. The mortality data of Typha revealed that Dalapon -I- Diesal oil at 20 -I- 30 kg / ha and Diuron -|- Ansar at 15 -I- 2 kg / ha gave conspicous control of this weed. During 1976 – 77, all formulations of 2, 4 - D at 1.5 to 2.0 kg a i / ha proved effective against water hyacinth. Gramoxone also killed the weeds but regeneration started after 60 days of spraying. During 1977 - 78 it was observed that the month of April was the best time for the control of this weed and 2, 4-D amine salt proved to be the best formulation. For the control of submerged weeds the effect of various treatments was observed on *Potamogeton perfoliatus*, *Hydrilla verticillata* and *Vallisnaria spirallis*. The lower concentration of Paraquat (1.0 and 2.0 ppm) did not prove effective against Hydrilla and Vallisnaria. Vallisnaria showed maximum resistance against herbicides. Scrapping and hand pulling of weeds from hydrosoil gave excellent control of these weeds but regeneration occured after 6 weeks where weeds were removed by hand pulling.

EFFECT OF FREQUENCIAL APPLICATION OF HERBICIDES ON THE CONTROL OF CANAL BANK WEEDS

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The experiment was conducted at the irrigation canal running accross the Research Farm of HAU Hissar for testing the various herbicide mixtures and their frequency of application during 1975-76 and 1976-77. During both the years herbicides were sprayed either once or in 2-3 split doses at an interval of 10 days starting from 10th August, when there is sufficient rainfall to fix the herbicides in soil. It was observed that single application of Dalapon when applied alone or in mixture with 2, 4-D did not enhance the weed kill beyond 30 per cent. However, the mortality percentage increased with corresponding increase in frequential application of herbicide. Diuron + Ansar at 10 + 5 kg a.i./ha proved most potent in killing the canal bank weeds at all the frequency levels. In the second year, 2 or 3 applications Dicryl + Atrazine + Dalapon at 5 + 10 + 10 kg a.i./ha and Gramoxone + Diuron + DSMA proved most effective in killing the canal bank weeds, Diuron + Ansar at 10 + 5 kg a.i./ha and Dalapon at 15 kg when applied thrice also gave good results as compared to Diuron when applied alone.

AN INTEGRATED PROGRMME FOR WEED MANAGEMENT AGAINST *SALVINIA MOLESTA* MITCHELL IN KERALA

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Salvinia molesta Mitchell, popularly known as 'African payal' in Kerala is one among the troublesome floating weeds of the world. Attempts for its effective control utilizing different methods are progressing, but so far no single method has proved to be successful in tackling the vexed problem. An integrated weed management strategy therefore be highly desirable to control the weed.

Though not economical, mechanical collection and removal is the most popular method. The need for an effective mechanical device for the weed collection and removal has been long-felt and prototypes have been developed

and tried from time to time with varying degrees of success. The feasibility of utilizing such mechanised contrivances for large scale weed collection is doubtful in Kerala.

Chemicals like paraquat have proved effective in paddy fields where the weed mat is not very thick and its use is fast gaining popularity The use of chemicals on an extensive scale might cause water pollution problems, particularly in water logged areas of the state like the Kuttanad area Studies on the pollution hazards due to frequent use of chemicals are to be carried out prior to wide scale adoption of any chemical. It would therefore be wiser to abstain from the extensive use of toxic chemicals.

The most permanent and economical means of weed management is the biological method Experiments in this line using insects, fishes, snails. manatees and pathogens are already in progress. But so far none of these organisms has been found to be an effective agent for weed management. The most exhastively studied among bio control agents is the grass hopper *Paulinia acuminata* De Geer Reports ensure its successful establsiehment in lake Kariba, Africa. But unfortunately this insect has so far failed to give any consistently promising results in Kerala mainly due to predation by natural enemies like spiders.

PRELIMINARY STUDIES ON THE UTILISATION OF INDIGENOUS CARP, PUNTIUS PULCHELLUS AS ONE OF THE BIOLOGICAL AGENTS OF WEED CONTROL IN PONDS

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Among indigenous fishes available, *Puntius pulchellus* (Day) seems to show a great promise as one of the biological agents in controlling aquatic weeds in ponds Preliminary studies conducted on the food preferences and growth of this fish in experimental cisterns have given encouraging results.

Fingerlings of *P pulchellus* stocked in cisterns were found to readily feed every day on common aquatic weeds, *Lemna* and *Hydrilla* when fed at 25% of their body weight. The fishes were able to gobble a mixture of these two weeds even beyond 50% of their body weight per day. It has been estimated

that advanced fingerlings of *P pulchellus* weighing from 10 to 14 g when stocked at the rate of 10 000/ha can consume weeds weighing 25 to 50 kg/ha/day. This works out to about 9 to 18 tons of aquatic weeds per/ha/yr. The growth of the fingerlings in the experimental cisterns in relation to their efficacy in consuming the two aquatic weeds has been discussed.

INTEGRATED WEED MANAGEMENT IN RAINFED GROUNDNUT

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The experiment was conducted in the All India Coordinated Research Project on oilseeds, Tindivenam, during *Kharif* 1977. The efficacy and selectivity of two herbicides (TOK-E-25 at 1.0 l a.i./ha and 2.0 l a.i./ha and Basalin at 0.75 and 1.5 l a. i /ha) alone and integrated with three leves of hand weeding at 20th day, 40th day were studied in a randomised block design with two replications. These treatments were compared with conventional method of manual weeding (20th and 40th day) adopted by farmers for their yield and economy.

The results showed that TOK-E-25 at 1 0 l a,i./ha + two weedings on 20th and 40th day, TOK-E-25 at 1.0 l a i /ha + weeding on 40th day were compared with, manual weeding in controlling the weeds and increasing the number of pods per plant and pod yield, Among the weed management treatments, TOK-E-2·5 1.0 l a. i./ha integrated with hand weeding on 20th and 40th day gave a higher yield (1256 kg/ha) followed by TOK-E-25 1.0 l a.i./ha + hand weeding on 40th day (1253 kg/ha) and were on par with farmers practice. The additional net income of Rs 246/ha and 239/ha were obtained in TOK-E-25 1.0 l a i. /ha + hand weeding on 40th day and TOK-E-25 1.0 l a. i /ha + hand weeding on 20th and 40th day respectively over hand weeding twice on 20th and 40th day. Application of Basalin was not effective on weeds.

WEED COMPOSITION IN IRRIGATED GROUNDNUT AS INFLUENCED BY WEED CONTROL TREATMENTS

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Studies were conducted at the Tirupati Campus of Andhra Pradesh Agricultural University during summer, 1977 to study the influence of pre -sowing, pre-emergence and post-emergence herbicides on weed composition in irrigated Groundnut (TMV_2). The weed composition showed that nut grass *Cypears rotundus* L.) was the single dominant weed at any time and was the lonely sedge that occurred. It's cumulative contribution during the crop period ranged from 4.6 to 90.7% in population and 0.4 to 64.3% in dry weight. Repeated hand weeding did not suppress this weed and only alachlor inhibited it. The grass weeds dominated in the crop whose population ranged from 1.2 to 78.7% and dry weight from 5 2 to 89.0% Fluchloralin effectively checked the grassy weeds. Broad leaved weeds were intermediate in position and its composition ranged from 5 0 to 23.9% in population and 4 0 to 58.4% by dry weight. Terbutryne effectively checked these weeds. The studies revealed that grass weeds were highly competitive.

EFFECT OF ZERO TILLAGE ON WEED CONTROL AND POD YIELD OF RAINFED GROUNDNUT

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Field experiments were conducted during *kharif* seasons of 1975 and 1976 on sandy loam soil of poor fertility at Tirupati campus of Andhra Pradesh Agricultural University with the object of saving time in preparatory cultivation for rainfed groundnut (Bunch A H 1192) and also effectively controlling weeds. The treatments consisted of three village methods ie. zero tillage, minimum tillage (2 ploughings) and conventional tillage (4 ploughings) alloted to main plots and weed control treatments alloted to sub-plots in a split plot design replicated thrice. The herbicides used were alachlor @ 2 kg a. i., nitrofen @ 1.0 kg a i. per hectare with and without supplemental hand weeding, weeding and weed free checks. In the second year, bentazon @ 1.92 kg a. i/ha as post-emergence application was included. The study revealed that zero tillage was comparable to minimum and conventional tillages in respect of