annual report

ANNUAL REPORT 1990-91

NRCWS

NATIONAL RESEARCH CENTRE FOR WEED SCIENCE
ADHARTAL, JABALPUR-482 004. (M.P.) INDIA.

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वार्षिक प्रतिवेदन 1990–91

(Date of Establishment : 22nd April, 1989)

DIRECTOR : DR.V.M.BHAN

NATIONAL RESEARCH CENTRE FOR WEED SCIENCE
ADHARTAL, JABALPUR – 482 004, M.P.

राष्ट्रीय खरपतवार विज्ञान अनुसंधान केन्द्र
अधारताल, जबलपुर – 482 004, म.प्र.

INTRODUCTION

The National Research Centre for Weed Science (NRCWS) was established by the Indian Council of Agricultural Research (ICAR) on April 22nd, 1989 at Jabalpur, (Madhya Pradesh). The Centre is located adjoining to the complex of the Jawahar Lal Nehru Krishi Vishva Vidyalaya. The experimental farm is 59.5 ha and is located 9 Km from the main Jabalpur Railway Station on Jabalpur-Allahabad Section of National Highway No. 7.

MANDATE :

The mandate of the Centre is "to act as a nodal centre in Weed Science for providing leadership through basic and applied multidisciplinary research, training and national facilities for research and information".

OBJECTIVES :

The objectives of the Centre are :-

1. To undertake research work on the biology, agro-ecology and physiology of weeds.
2. To study aquatic and problem weeds and their control.
3. Initial identification and evaluation of new herbicides and also development of bio-herbicides for problem weeds.
4. Bio-chemistry of herbicides and its long term effect on the cropping system.
5. To develop technology for biological and non-chemical methods of weed control and also development and testing of weed control equipments.
6. To generate data on residue estimation and management of herbicides in soil, water and plants, cropped and non-cropped situations and computer facility for data analysis and record making.
7. To conduct training programme in weed science.
8. To conduct 'on farm testing' and 'operational research' projects regarding the use of recommended and newly developed weed management technology at farmers field.

The AICRP on Weed control with its Head Quarters at NRCWS and its 19 centres located at various SAU's will work on applied research and on problems of their region to provide instant answer to the socio-economic needs concerning weed management of their areas.

BACKGROUND :

A Coordinated Weed Control Scheme on Wheat, Rice and Sugarcane in 11 States was initiated as early as 1952 by the ICAR to monitor the weed flora and to find out relative feasibility of chemical weed control. Later, a number of Crop Research Institutes of ICAR and SAU's have been involved in the weed control research and also developed teaching programme at under graduate and post

graduate levels. It was in 1978, when the research programme in weed science was strengthened, AICRP-WC was developed at ICAR in collaboration with USDA. The programme started at 6 locations and the complete programme came into functioning with 19 centres located at different SAU's, and ICAR Institutes. The major objectives of this programme was to survey weed problems, emphasising on the important weed problems of their own area of jurisdiction and to develop package of practices of appropriate weed management in cropped and non-cropped situations. Some of the important research thrust areas included were to work out effective and economic weed control schedules for field, orchard and vegetable crops under different cropping systems; to develop weed control tools and implements; to study the biology and ecology of most of the problem weeds of cropped and non-cropped situations; to study physiology and residue of herbicides under different ecosystems; to train personnels with latest weed management technology; on farm research trials and to disseminate the information to the farming community. It was invariably thought that this programme lacks basic science approach and it may not be possible at every centre. Considering the basic research thrust in overall programme of weed science and with a view to assist present weed research programme, ICAR established a National Research Centre for Weed Science at Jabalpur in April, 1989.

STAFF AND BUDGET :

The present sanctioned staff strength of the Centre including AICRP-WC Project Unit comprises of 27 Scientists assisted by a team of 27 Technical, 17 Administrative, 25 Supporting and 3 Auxiliary staff.

The annual budget expenditure of the centre for the year 1991-92 was Rs.49,78,218/-.

Functional relationship and area of work of various sections & units :

Weed management in cropping system :

(i) Initial indentification and evaluation of herebicides. (ii) Weed management in cropping system with emphasis on low land rainfed rice system. (iii) Study of the long term effect of herbicides in important cropping systems. (iv) Designing and testing of weed control equipments (in association with Engineering Unit)

Biology and agro-ecology of weeds :

(i) Study of biology and ecology of important weed species. (ii) Study of weed shift in crop and non-crop systems. (iii) Survey and mapping of important weeds (in association with AICRP-WC)

Vegetation management :

(i) Biological and non-chemical control of weeds. (ii) Biology and control of aquatic, parasitic, perennial and problem weeds. (iii) Weed management in non-cropped system.

Herbicide management and weed physiology :

(i) Behaviour of weeds. (ii) Chemistry and mode of action of herebicides. (iii) Herbicide residue estimation and their management in soil-water-plant, in crop and non-crop situation. (iv) Indentification and development of bio-herebicides.

Social science Training and Transfer of Technology :

To generate information on socio-economic aspects of weed management in different cropping systems. To develop computer laboratory to assist scientists in various forms of analysis; to develop data base information system. Develop courses and conduct training programmes in weed science. To conduct 'on farm testing' and operational research projects to generate information on weed management technology at farmers field.

Engineering Unit:

Designing and testing of weed control equipments (in association with CIAE, Bhopal; IIT, Kharagpur and any other AICRPWC Centre having facility of designing and development of field equipments). The work is to be done in association with Agronomists in management cropping system.

Experiment Station :

Providing infrastructure facilities for research at farm. Preparation of plan and execute land development programme. Develop cropping plan and its execution for non-experimental area.

INFRASTRUCTURAL FACILITIES :

The National Research Centre for Weed Science acquired 59.5 ha Experiment Station from Jawahar Lal Nehru Krishi Vishwa Vidyalaya on January 1, 1990. The Office is located in two private buildings at Ravindra Nagar, Adhartal, Jabalpur which is 6 km away from the Experiment Station.

The Centre has started developing its laboratory, library and other necessary facilities. Step are being taken to appoint scientific and tecilities. Steps are being taken to appoint scientific and technical staff. The staff position during the period under report is detailed in Table -1.

Table - 1. Staff Position Under VIIth Plan (as on 31.3.1991)

Catagory	Details of Posts Sanctioned under VIIth Plan		
	Sanctioned	Filled	Vacant
Scientific	27(x)	03	24
Technical	27	05	22
Administrative	17	10	07
Supporting	25	06	19
Auxiliary	03	03	–
	98	27	72

(x) Excluding 2 post of RMP (Director and Project Coordinator)

Computer Service :

The Centre has acquired a new advanced PC-AT computer to support research work, administration and audit & accounts work.

Climate & Soils :

Jabalpur is situated between 22.49° and 24.8° North Latitude and 78.21° and 80.58° East Longitude at an altitude of 411.78 meters above the mean sea level. The tropic of cancer passes through the middle of district. Jabalpur comes under the agroclimatic region of Kymore Plateau and Satpura Hills and lies in the Rice-Wheat crop zone of the State. The climate of Jabalpur region is typically semi-humid and sub-tropical. The winter is cool and summer is hot and dry. The average annual rainfall was 1860.4 mm which was

mostly received between June and September. Very little rainfall was received during October to March. The mean maximum temperature during the hottest month of May was 38.9°C. January was the coldest month of the year with an average maximum temperature of 23.8°C and lowest temperature being 0.5°C. The details of weather data are given in Table 2.

Table 2 : Meteorological data recorded at Adhartal Farm, JNKVV, Jabalpur during 1990 = 91.

Month	Rainfall (mm)	Temperature		Relative humidity	
		Mean Max.	Mean Min.	Mean Max.	Mean Min.
April, 1990	00.0	38.7	20.8	42	11
May, 1990	21.9	38.9	26.1	56	29
June, 1990	520.1	34.0	25.5	79	61
July, 1990	394.3	28.5	23.8	91	82
August, 1990	296.4	30.3	24.5	92	77
September, 1990	498.1	28.9	23.6	95	82
October, 1990	00.0	30.6	19.8	92	53
November, 1990	00.0	28.7	13.4	89	37
December, 1990	07.4	25.6	10.4	90	42
January, 1991	00.5	23.8	8.0	89	40
February, 1991	16.3	29.5	12.7	82	38
March,1991	05.4	33.8	16.2	72	26

SOIL :

The soil of the farm belong to Kheri series. The kheri series is a member of the very fine, montmorillonitic, hyperthermic family of Typic Chromusterts. Kheri soils have dark greyish brown moderately alkaline AC horizons. They have developed in basaltic alluvium on level to very gently sloping piedmont plains in Jabalpur and Narsinghpur districts of Madhya Pradesh at an elevation of 375 to 400 m above MSL. The principal associated soil is Adhartal series, a vertic Ustochrept.

Forums:

The Institute has various forums which serves the purpose of research planning, management, staff welfare, etc. The staff Research Council is yet to be constituted as number of Scientists are expected to join.

The Centre's Experiment Station Advisory Committee is formed comprising of all scientist, Farm Manager, Incharge Farm and nominated members from the official and Station side with the Director as its Chairman meets at frequent interval to discuss and review the work progress at Experiment Station.

The General Body Meeting (GBM) of the Centre has been arranged twice to know the problems of the staff, if any.

The Centre has constituted its 'Joint Staff Council' which meets quarterly and deals with the welfare of the staff. The Joint Staff Council comprises of elected representatives from the staff side and nominated members from the official side with the Director as its Chairman.

The Centre's Staff Recreation Club is constituted to encourage and develop athletic, cultural and social outlook of the members.

RESEARCH PROGRAMMES

Influence of 2,4-D on growth and development of *Parthenium hysterophorus* :

The effect of 2,4-D on control of Parthenium plants sprayed with 2,4-D @ 1.0-Kg, 2.0 Kg/ha; 2,4-D 1.0 Kg/ha + oil 2 l/ha; 2,4-D 2.0 Kg/ha + oil 1 l/ha + Teepol @ 50 ml/100 l of solution; 15% common salt at four leaf stage was observed. The observations of plant characters, viz; number of leaves, plant height, newly branches, number of flowers were taken at 15 days interval.

The application of 2,4-D @ 2.0 Kg/ha + oil 1 l/ha + Teepol @ 50 ml/100 l of solution has shown best result on reducing the growth and developmental parameters of *Parthenium hysterophorus* (Table 3).

Table 3 : Effect of herbicides on rate and development of *Parthenium hysterophorus* growth and development parameters.

Sl No.	Treatments	No. of leaves No./Plant			Plant height cm			No. of branches/plant			No. of flowers/plant		
		Days after spraying			Days after spraying			Days after spraying			Days after spraying		
		15	30	45	15	30	45	15	30	45	15	30	45
1.	2,4-D @ 1 Kg/ha	7	14	34	10.34	16.40	46.60	–	1	11	–	5	39
2.	2,4-D @ 2 Kg/ha	6	16	30	9.40	14.40	36.60	–	1	10	–	4	32
3.	2,4-D @ 1 Kg/ha + Oil 2 L	6	11	23	6.10	13.80	33.20	–	0	7	–	1	20
4.	2,4-D @ 2 Kg/ha + oil 1 L + Teepol @ 50ml/ 100 L of solution.	5	10	17	9.33	17.00	42.67	–	0	6	–	0	9
5.	15% common salt	7	16	37	10.00	22.60	47.40	–	2	12	2	6	38
6.	Untreated	9	16	66	12.28	25.60	47.20	–	4	25	2	12	90

Influence of cropping sequence on emergence of weeds :

The experiment was conducted with the objective to study the long term influence of cropping sequence on emergence of weeds. During *rabi* 1990, wheat and pea were grown (Table 4). It was found that all the weed free plants in both the crops produced higher yields. The major weeds emerged out during the season were *Phalaris minor, Rumex dentata, Chenopodium album, Chicorium intybus, Crozophora plicata, Malachra sp.*

Table 4 : Influence of cropping sequence on emergence of weeds

Sl. No.	Crop Sequence	Rabi Crop 1990-1991	Unweeded check plot (No./m^2)								Grain yield kg/ha		% increase ingrain yield over control
			Phalaris minor	Rumex dentata	Chenopodium album	Chicorium intybus	Crozophora plicata	Malachra sp.	Other	Total weed population No./M^2	Unweeded check plot	Weed free plot	
01.	Rice-Wheat	Wheat	8	6	4	2	1	2	3	26	2925	3178	8.0
02.	Rice - Pea	Pea	3	10	6	4	3	–	2	28	434	720	65.6
03.	Soybean-Wheat	Wheat	5	5	6	2	3	1	4	26	2884	3271	13.4
04.	Soybean-pea	Pea	–	10	5	5	4	–	3	27	435	649	49.2
05.	Maize-Wheat	Wheat	6	7	4	4	2	2	4	29	2929	3310	13.4
06.	Maize-Pea	Pea	–	7	9	5	4	2	1	28	355	554	56.0

Influence of irrigation, nitrogen and weed management levels on emergence of weeds and their control in wheat :

The experiment was conducted in a split plot design with five levels of irrigation (0, 0.3, 0.6, 0.9 & 1.2 IW/CPE ratio), four levels of nitrogen (0, 40, 80 & 120 kg N/ha) and four weed management levels (2, 4-D @ 0.5 kg/ha, 2,4-D @ 1.0 kg/.ha weed free and weedy) (Table 5.)

Table 5 : Influence of irrigation, fertility and weed management levels on population of weeds, plant height and yeild of wheat.

Sl.No.	Treat- ments	Number of weeds/m^2	Plant Height cm	Grain Yield q/ha
01.	**Irrigation Levels (IW/CPE ratio)**			
	0.00	3.50	59.60	15.40
	0.30	5.50	65.60	22.10
	0.60	36.00	77.00	27.80
	0.90	36.50	86.60	36.10
	1.20	41.60	91.10	43.70
	CD at 5%	10.76	0.93	0.88

Sl.No.	Treat ments	Number of weeds/m^2	Plant Height cm	Grain Yield q/ha
02.	**Nitrogen Levels**			
	0.00 Kg/ha	16.20	73.60	23.10
	40.00	20.50	75.40	28.00
	80.00	28.20	76.80	31.30
	120.00	33.90	78.20	33.80
	CD at 5%	6.33	0.39	0.42
03.	**Weed Management Levels**			
	2,4-D @ 0.5 kg/ha	13.50	75.90	28.30
	2,4-D @ 1.0 kh/ha	6.70	76.20	28.30
	Weed Free	3.20	76.50	30.00
	Unweeded Check	75.50	65.30	28.50
	CD at 5%	7.25	0.17	0.47

Increase in irrigation levels significantly increased number of plant height and grain yield/ha. The highest grain yield/ha was recorded at 1.2 IW/CPE. Increase in IW/CPE ratio from 0.6 onwards increased the number of weeds/m^2 significantly over lower ratios.

Each successive level of nitrogen increased plant height and grain yield/ha. The number of weeds/m^2 also increased significantly with each successive level of nitrogen.

Application of 2,4-D @ 1.0 kg/ha has recorded higher plant height and grain yield over control and 2,4-D @ 0.5 kg/ha. It has reduced weed population significantly over control when compared at its lower dose.

Influence of fluroxypyr, clopyralid, 34-D and isoproturon on control of broad leaved weeds in wheat :

Post-emergence application of fluroxypyr + isoproturon 150 ± 750 g/ha has given highest yield but weed free (Table 6). This combination of herbicides also reduced weed population significantly.

Table 6 : Effect of fluroxypyr, clopyralid, 2,4-D and isoprturon on population of weeds and grain yield of wheat.

Sl. No.	Treatments	Rate of Appli cation g/ha	Popula-tion of weeds No.2/m^2	Grain Yield q/ha
01.	Fluroxypyr	100	52.33	32.50
02.	Fluroxypyr	150	39.00	38.66
03.	Fluroxypyr	200	17.66	38.66
04.	Clopyralid	100	51.00	35.33
05.	Clopyralid	150	32.66	38.16
06.	Clopyralid	200	31.00	37.33
07.	2, 4-D	500	14.16	34.33
08.	Isorproturon	750	18.33	32.00
09.	Fluroxypyr + Isoproturon	150 + 750	5.66	42.33
10.	Clopyralid + isoproturon	150 + 750	7.00	41.16
11.	2,4-D + isoproturon	500 + 750	8.00	36.66
12.	Hand Weeding		8.33	35.00
13.	Weed Free		3.00	48.33
14.	Weedy Check		113.66	29.33
	Critical difference at 5%		5.90	2.88

Influence of tralkoxydim, oxyfluorfen and isoproturon on control of grassy and broad leaved weeds :

Post-emergence application of tralkoxydim alone or in combination with 2,4-D @ 0.5 kg/ha has proved quite effective in controlling weeds and boosting grain yield of wheat. But pre-emergence application of oxyfluorfen (o.3 - 4.0 kg/ha) has significantly reduced grain yield due to the toxic effect of this chemical on wheat (Table 7).

Table 7 : Effect of tralkoxydim, oxyfluorfen and isoproturon on population of weeds and wheat plants and grain yield of wheat.

Sl. No.	Treat ments	Rate of appli cation g/ha	Tillers No./m row length	Popula tion of weeds No./m^2	Grain yield q/ha
01.	Tralkoxydim (PO)	250	17.06	39.00	38.00
02.	Tralkoxydim (PO)	350	16.86	23.00	41.00
03.	Tralkoxydim (PO)	450	17.70	20.33	43.00
04.	Oxyfluorfen (PE)	200	12.86	29.33	38.66
05.	Oxyfluorfen (PE)	300	12.00	11.00	33.00
06.	Oxyfluorfen (PE)	400	5.86	7.66	24.00
07.	2, 4–D	500	18.60	16.00	38.66
08.	Tralkoxydim 2, 4-D	350 + 500	17.00	6.66	42.66
09.	Oxyfluorfen + 2,4-D	300 + 500	18.66	5.66	38.16
10.	Hand weeding		16.80	7.00	42.00
11.	Weed free check		18.66	3.00	46.66
12.	Weedy check		16.93	115.33	36.16
	CD at 5%		2.31	14.15	2.20

Effect of post-emergence application of atrazine on grain yield of maize :

Application of atrazine @ 1.5 kg/ha at 25 DAS has proved quite effective in increasing grain yield of maize. Spraying atrazine after 25 days was found to reduce grain yield which may be due to poor weed control. Hand weeding at 30 DAS has produced higher grain yield weed free check (Table 8). (Data on weed growth could not be recorded).

Table 8 : Effect of post-emergence application of atrazine on grain yield of maize.

Sl. No.	Treatments	Grain Yield q/ha
01.	Atrazine 0.5 kg/ha at 25 DAS	16.40
02.	Atrazine 0.5 kg/ha at 30 DAS	11.40
03.	Atrazine 0.5 kg/ha at 35 DAS	11.31
04.	Atrazine 1.0 kg/ha at 25 DAS	18.98
05.	Atrazine 1.0 kg/ha at 30 DAS	15.18
06.	Atrazine 1.0 kg/ha at 35 DAS	14.42
07.	Atrazine 1.5 kg/ha at 25 DAS	20.72
08.	Atrazine 1.5 kg/ha at 30 DAS	16.62
09.	Atrazine 1.5 kg/ha at 35 DAS	14.19
10.	Hand weeding at 25 DAS	22.34
11.	Hand weeding at 30 DAS	22.55
12.	Hand weeding at 35 DAS	22.15
13.	Weed free check	27.97
14.	Control	09.51
	CD at 5%	01.92
	CV %	7.0

Effect of fluazifop-p-butyl application on grain yield of soybean :

Fluazifop-p-butyl @ 500 g/ha applied 30 days after sowing has given higher grain yield of soybean when compared with other herbicide treatments. Hand weeding at 30 DAS has produced maximum grain yield when