



ICAR - DWR

SIGNIFICANT ACHIEVEMENTS

2022 - 2023



ICAR - Directorate of Weed Research
Jabalpur - 482 004, (Madhya Pradesh)
<https://dwr.icar.gov.in>





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PREFACE

The potential yield losses from weeds have increased in response to management and environmental change since the dawn of the Green Revolution. Reducing yield losses from weeds is increasingly challenging due to extreme climate events, weed seed dispersal through global trade, weed flora shift, evolution of herbicide resistance in weeds, etc. Therefore, development of sustainable weed management technologies incorporating the interaction of environmental, economic and societal dimensions of agro-ecosystems is urgently required to protect the high yield potential of modern crop varieties. The major accomplishments of ICAR-DWR during 2022-23 are precisely presented in this document.

The achievements are grouped into different themes. Development of integrated weed management technologies for different crops (millets, rice, chickpea, onion and sugarcane) and CA-based cropping systems (rice-wheat/chickpea-green gram, maize-wheat/chickpea-green gram, cotton-maize-green manure, sweet corn-fennel, rice-rice, etc.), development of multi-nozzle spray boom holding tool and ergo-refined tri-cycle boom sprayer and mycorrhizal consortium for suppression of parasitic weeds like *Striga* in sugarcane was major achievement under **sustainable weed management** programme. While, chloroplast genome sequence of *P. hysterophorus*, biological control of *Salvinia molesta* by *Cyrtobagous salviniae* weevils and weed-based phytoremediation system contributed significantly in **management and utilization of invasive alien weeds**.

The major achievements in **crop-weed interference and herbicide efficacy under changing climate** were evaluation of efficacy of bispyribac sodium against grassy weeds and sedges in rice, and carfentrazone-ethyl against *Rumex dentatus* in wheat, which was delayed by 3-6 days under elevated CO₂ (550±50 ppm). A LCMS/MS method has been developed for simultaneous determination of degradation of carfentrazone-ethyl and its degradation metabolites in soil and wheat plant in **environmental impacts of herbicides and mitigation measures**. The major achievements of different outreach programmes such as MGMT, FFP and SCSP have been covered under **capacity development and farmers outreach activities**. These programmes helped the Directorate to reach the unreached through conduct of FLDs, trainings, skill development, extension activities, development of mobile app, and supply of inputs such as quality seeds & planting materials, herbicides, fertilizers, etc. Besides, documented 123 success stories of farmers towards **Doubling of farmers' income**. To widen the scope of weed research, the Directorate has signed MoUs with different organizations. In addition, **publications, recognitions, seed production, new facilities, and revenue generation** summarizes the achievements of the Institute in these areas.

This document is an effort to provide a glimpse of DWR's achievements during year 2022-23. The inputs from all the scientists of DWR and AICRP-WM centres are duly acknowledged with thanks. We hope that this publication will be useful to the researchers, students, farmers and other stakeholders.

Editors

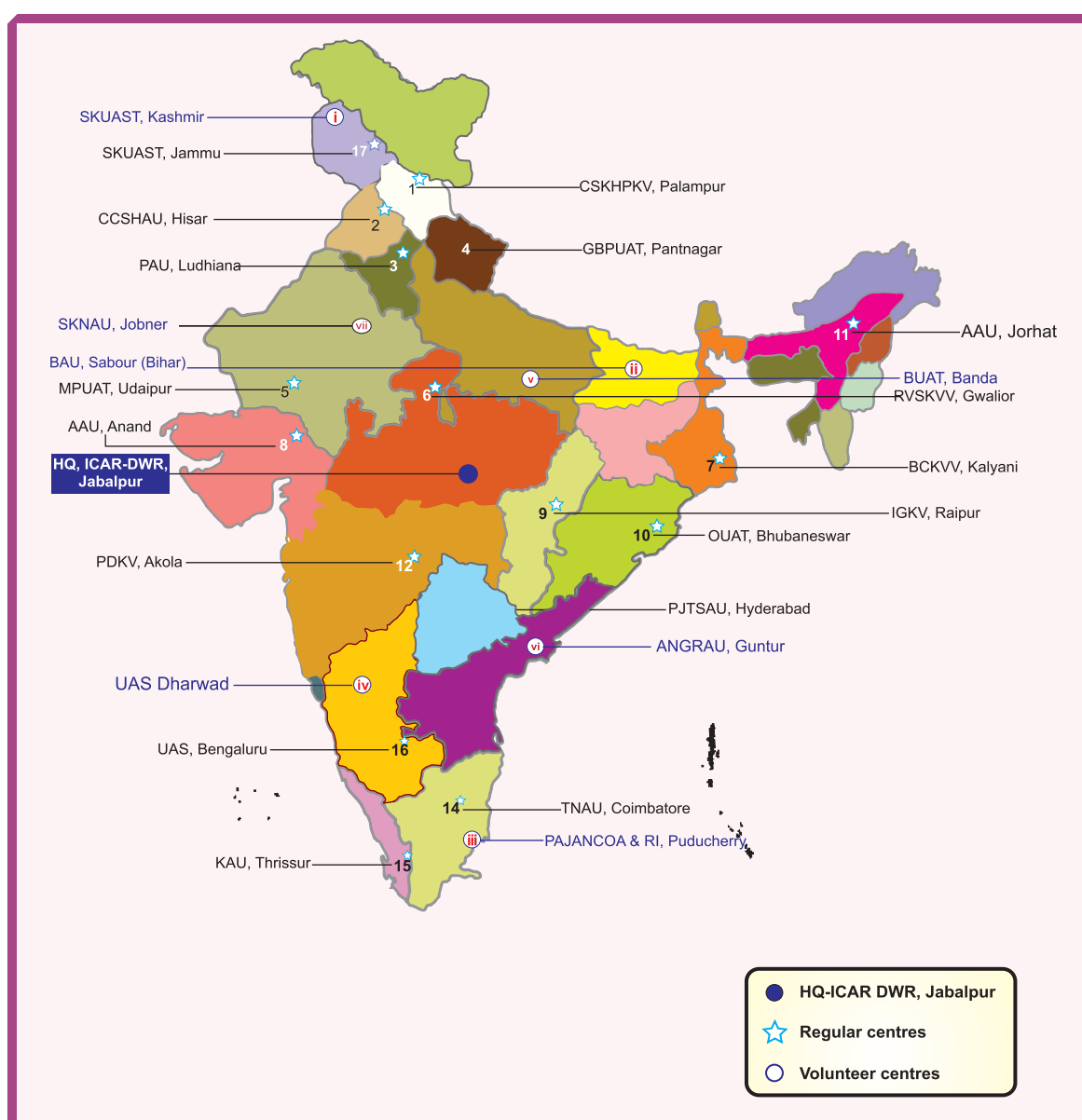
Date: April 20, 2023

Place: Jabalpur



ICAR-Directorate of Weed Research

All India Coordinated Research Project on Weed Management





ICAR-Directorate of Weed Research

Significant Achievements 2022-23

A. Sustainable Weed Management in Different Crops and Cropping Systems Millets

- In organically grown direct-seeded finger millet, reduced row spacing (20 cm) *fb* hand weeding (HW) at 20 days after sowing (DAS) was comparable to stale seedbed *fb* HW at 20 DAS, crop residue mulch at 6 t/ha *fb* HW at 20 DAS, two HW at 20 & 40 DAS and mechanical weeding at 20 DAS *fb* HW at 40 DAS in terms of weed control, grain yield (2.15 t/ha) and B: C (3.26).



- In direct-seeded finger millet, application of atrazine 500 g/ha as pre-emergence (PE) *fb* metsulfuron-methyl + chlorimuron-ethyl 4 g/ha as post-emergence (PoE) or pyrazosulfuran-ethyl 15 g/ha as PE *fb* metsulfuron-methyl + chlorimuron-ethyl 4 g/ha as PoE were superior in controlling weeds (AICRP-WM, UAS, Bangalore and IGKV, Raipur).



Atrazine 500 g/ha as PE *fb* metsulfuron-methyl + chlorimuron-ethyl 4 g/ha as PoE



Pyrazosulfuran - ethyl 15 g/ha as PE *fb* metsulfuron-methyl + chlorimuron-ethyl 4 g/ha as PoE



Weedy check

Rice

- In dry direct-seeded rice, application of pendimethalin 1.0 kg/ha (pre-em) at evening (4 pm) and morning (8-10 am) was found effective than mid-day application.



- Application of pendimethalin 1.0 kg/ha as PE *fb* tank mix application of bispyribac-sodium 25 g/ha + [(metsulfuron-methyl + chlorimuron-ethyl) (ready mix)] 4 g/ha at 25 DAS or pendimethalin 1.0 kg/ha as PE *fb* penoxsulam + cyhalofop-butyl (RM) 135 g/ha at 25 DAS effectively controlled weeds, indicating the necessity of combination of herbicides to manage complex weed flora in DSR (AICRP-WM, UAS Bangaluru and IGKV, Raipur).
- Sequential application of penoxsulam + pendimethalin 625 g/ha as PE *fb* fenoxaprop ethyl 67 g/ha + ethoxysulfuron 18 g/ha at 25-30 DAS was also effective in coastal deltaic region of Karaikal, Puducherry (AICRP-WM, Puducherry).



Pendimethalin 1000 g/ha (30 EC) as PE *fb* bispyribac-sodium 25 g/ha + [(metsulfuron methyl + chlorimuron ethyl) (RM)] 4 g/ha (Tank mix) as PoE (25 DAS)



Pendimethalin 1000 g/ha (30 EC) as PE *fb* penoxsulam + cyhalofop-butyl (RM) 135 g/ha as PoE (25 DAS)



Weedy check

- For management of invasive aquatic weed *Salvinia molesta* in transplanted rice, pre-mix application of cyhalofop-butyl + penoxsulam 0.15 kg/ha or butachlor + penoxsulam 0.82 kg/ha or florpyrauxifen benzyl + cyphalofop-butyl 0.15 kg/ha along with a spreader/surfactant at 2 ml/L of spray fluid effectively controlled the weed when sprayed on the *Salvinia* mat at 20-25 days after transplanting (AICRP-WM, KAU, Thrissur).



- Post-emergence application (18-20 days after sowing/transplanting rice) of 2,4-D sodium salt 1.0 kg/ha or metsulfuron-methyl + chlorimuron ethyl 4 g/ha or florpyrauxifen benzyl + cyhalofop butyl 150 g/ha or florpyrauxifen benzyl 31.5 g/ha, or early PoE application of any of penoxsulam + pendimethalin 625 g/ha or butachlor + penoxsulam 0.82 kg/ha along with an adjuvant/ sticker 2 ml/L of spray fluid has been found effective in managing the aquatic weed *Limnocharis flava* in rice (AICRP-WM, KAU, Thrissur).



Chickpea

In chickpea, application of topramezone 20.16 g/ha at 20 DAS provides good control on broad-leaved weeds but grassy weeds like *Avena ludoviciana* and *Phalaris minor* could not be effectively controlled. Thus, tank mixing of topramezone + quizalofop 20.16 + 50 g/ha (20 DAS) provides broad-spectrum weed control and higher seed yield.



Onion

- In onion nursery, early PoE application (10-15 DAS) of propaquizafop 5% + oxyfluorfen 12% w/w EC (RM) 43.75+105 g/ha or oxyfluorfen 23.5% EC 80 g/ha or PE application (1-2 DAS) of pendimethalin at 300 g/ha has been found promising (AICRP-WM, AAU, Anand).

- In transplanted onion, application of pendimethalin 38.7% CS 580.5 g/ha at 2-3 days before transplanting or pendimethalin 580.58g/ha (PE or PPI) *fb* oxyfluorfen 23.5% EC 120 g/ha at 25-30 days after transplanting (DAT) or oxyfluorfen 23.5% EC 120 g/ha at 2-3 DAT *fb* propaquizafop 5% + oxyfluorfen 12% w/w EC (RM) 43.75 +105 g/ha at 25-30 DAT or propaquizafop 5% + oxyfluorfen 12% w/w EC (RM) 43.75 +105 g/ha at 25-30 DAT was very effective for broad-spectrum weed control (AICRP-WM, AAU, Anand).



Pendimethalin 38.7% CS 580.5 g/ha PPI
(2-3 days before transplanting)



HW at 20 and 40 DAT



Weedy check

Sugarcane

Due to wider row spacing, slow initial growth and longer crop duration weeds are major problem in sugarcane. A new three way herbicides, ready-mix of 2, 4-D sodium salt + metribuzin + pyrazosulfuron-ethyl 2.40 kg/ha (PoE) provided excellent weed control (>95%) for a longer period and 32% more cane yield (110 t/ha) as compared to farmer's practice (atrazine 1.5 kg/ha).



Weedy check



2,4-D sodium salt + metribuzin + pyrazosulfuron-ethyl
2.40 kg/ha

Conservation agriculture-based systems

- Grasses and perennial weeds are major hurdles in adoption of conservation agriculture (CA). In rice-wheat/chickpea-greengram cropping system, sequential application of pretilachlor + prazosulfuron 615 g/ha (PE) *fb* cyhalofop + penoxsulam 135 g/ha (20 DAS) *fb* HW (40 DAS) in rice, clodinafop + metsulfuron 60+4 g/ha

(30 DAS) *fb* HW (45 DAS) in wheat/pendimethalin 678 g/ha (PE) *fb* topramezone 20.16 g/ha (20 DAS) in chickpea and pendimethalin 678 g/ha (PE) *fb* HW at 25 DAS in greengram provided broad-spectrum weed control and the higher system productivity and profitability.

- In maize-wheat/chickpea-greengram cropping system, tank-mix application of atrazine + topramezone 500 + 25.2 g/ha in maize, clodinafop + metsulfuron 60 + 4 g/ha (30 DAS) *fb* HW (45 DAS) in wheat/ pendimethalin + imazethapyr 1000 g/ha (PE) *fb* topramezone 20.16 g/ha (20 DAS) in chickpea and pendimethalin 678 g/ha (PE) *fb* HW at 25 DAS in greengram provided broad-spectrum weed control and the highest system productivity and profitability.



Rice-wheat-greengram



Maize-chickpea-greengram

- In zero till cotton-maize - green manure cropping system application of diuron 0.75 kg/ha or pendimethalin 1.0 kg/ha as PE *fb* tank mix application of pyriithiobac-sodium 62.5 g/ha + quizalofop-ethyl 50 g/ha as PoE (2-3 weed leaf stage) *fb* directed spray (inter-row) of glufosinate ammonium 450 g/ha at 50-55 DAS effectively controlled the weeds in cotton. In subsequent maize, application of atrazine 1.0 kg/ha + paraquat dichloride 600 g/ha as PE *fb* tembotrione 120 g/ha at 20-25 DAS was found to be effective for weed control (AICRP-WM, PJTSAU, Hyderabad)



ZT cotton



ZT maize

- In sweet corn-fennel cropping system, soil solarisation during summer months using transparent plastic sheet of 100 μ thickness and 2 m width for a period of 4 weeks has been found very effective. These plastic sheets are removed in the 1st week of June and field is prepared for sowing. Sowing beds are prepared with 1.2 m wide and covered with a strip of black/silver plastic sheet with the help of tractor drawn mulch laying machine. Sweet corn is sown at 60 cm x 25 cm spacing in each strip by making hole in poly-mulch. For sowing of one hectare area, 14 rolls of 1.2 m width-400 m length poly mulch is required. This can be reused for succeeding crop, if carefully handled (AICRP-WM, MPUAT, Udaipur).



- In transplanted low land rice - blackgram cropping system, application of bensulfuron-methyl +pretilachlor 660 g/ha as PE *fb* bispyribac sodium 25 g/ha as PoE in rice effectively controlled the weeds and provided higher rice yield (7.57 t/ha).
- In cotton – baby corn cropping system conventional tillage with early PoE application of topramezone 12.5 g/ha + brush cutter at 20-35 DAS provided satisfactory weed control in baby corn (AICRP-WM, TNAU, Coimbatore).



- In rice-rice cropping sequence, PoE application of pyrazosulfuron 25g/ha *fb* PoE application of bispyribac sodium 25g/ha as PoE was found effective (AICRP-WM, AAU, Jorhat).
- In rice-chickpea-greengram cropping system, 24 microbes have been isolated and selected based on their morphology and ability to significantly solubilize cellulose

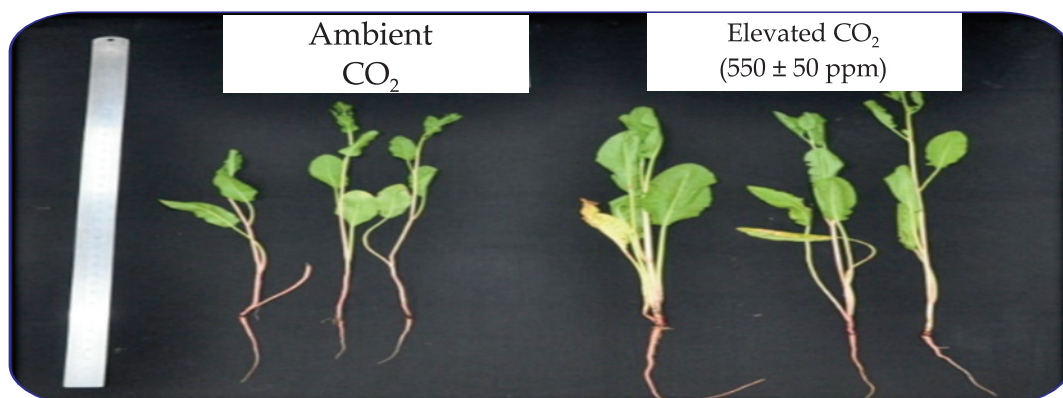


C. Crop-weed Interference and Herbicide Efficacy under Changing Climate



Crop-weed interaction and herbicide efficacy in rice under elevated CO₂

- Under elevated CO₂ (550±50 ppm), the efficacy of rice herbicide bispyribac sodium (X=25g/ha) was reduced (5, 4, and 4 days delay against *E. colona*), (6, 5, 5 days delay against *A. paronychioides*), (4, 3, 3 days delay against *Cyperus iria*) and (4, 3, 3 days delay against *Dinebra retroflexa*) at 1X, 1.5X and 2X doses, respectively. However, the extent of reduction was higher in *A. paronychioides* and *E. colona* as compared to *C. iria* and *D. retroflexa*.
- The growth and biomass of *E. colona* and *A. paronychioides* was more than *C. iria* and *D. retroflexa* under eCO₂ compared to ambient.
- The efficacy of carfentrazone-ethyl was delayed under elevated CO₂ (550 ± 50 ppm). Growth and biomass of *Rumex dentatus* was positively responded to eCO₂. It was noticed that the degradation of carfentrazone-ethyl in soil and wheat plant was less under eCO₂ than under ambient condition.



Impact of elevated CO₂ on *Rumex dentatus* growth



D. Management and Utilization of Invasive Alien Weeds

Biocontrol of Water fern (*Salvinia molesta*) at STPS Sarni

Madhya Pradesh Power Generation Company Limited (MPPGL) has awarded a consultancy project of Rs 50 lakh to the Directorate for biological control of *Salvinia molesta* in about 1100 hectares of the water reservoir of Satpura Thermal Power Station (STPS) at Sarni in Betul district, Madhya Pradesh. The first release of 1.5 lakh *Cyrtobagous salviniae* weevils was done on 18 September 2022 and further releases were made in October and November 2022. Encouraging results were obtained in terms of control of weeds in the lake. The samples taken from the lake revealed the increased population build-up of bioagents. Till February 2023, 60% of the water reservoir was cleared of the weed. It is expected that the whole lake will be cleared of the weed within the next 5 to 6 months.



Salvinia infestation in STPS



Discussion with stakeholders before release of bioagent



Release of bioagent



Damage part of plant by bioagent



Showing the effect of bioagent on *Salvinia*



Water visibility due to effective control

Weed-based phytoremediation system

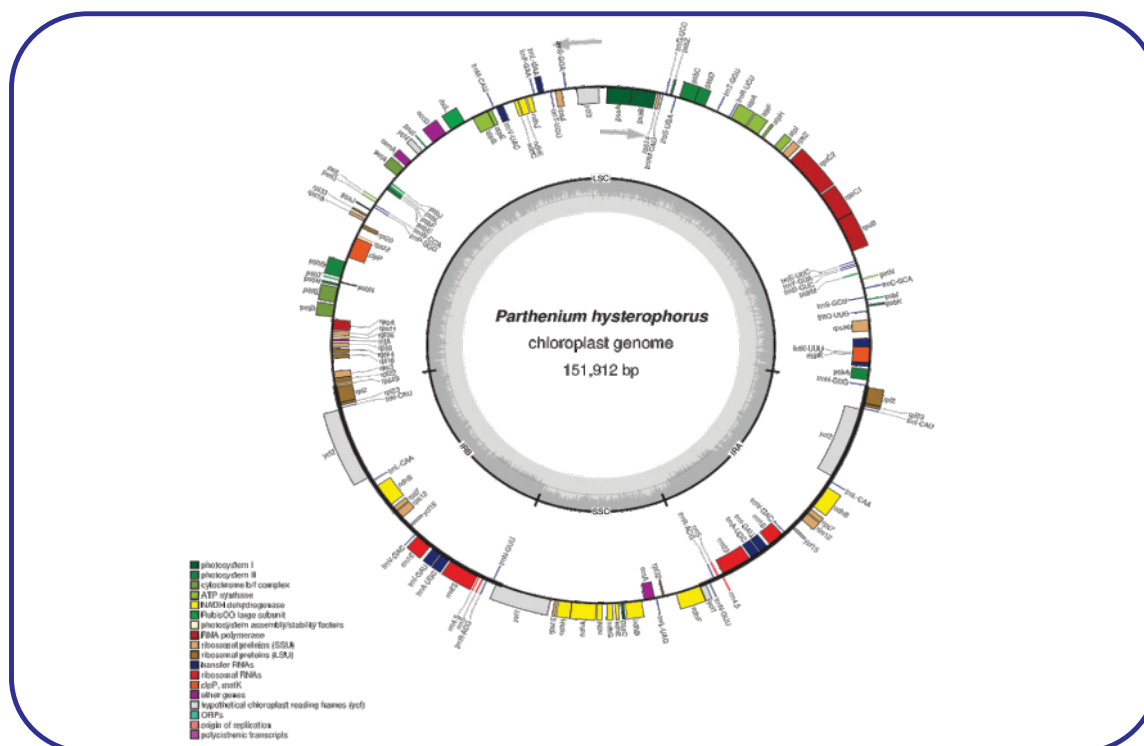
- Weed-based phytoremediation system based on horizontal wetland model, where heavy metal such as arsenic (As) contaminated water sequentially passed through weed treatment tanks where hyper accumulator weeds like *Typha latifolia*, *Eichhornia crassipes* and *Hydrilla verticillata* were grown, shown to reduce As concentration in final outlet.
- In *Typha latifolia*-*Eichhornia crassipes*-*Hydrilla verticillata* sequence As concentration in the water was reduced by 94.92% after 5 days treatment with *T. latifolia* compared to initial added concentration ($1000 \mu\text{g L}^{-1}$). Further treatment by *E. crassipes* for 5 days increased the overall As removal from 94.92 to 95.62%. When *T. latifolia* fb *E. crassipes* treated water further subjected to *Hydrilla verticillata* for another 5 days, the concentration of As in contaminated water further reduced by 98.44% of the total As added. The final As concentration after *H. verticillata* treatment was found 98.44% $\mu\text{g L}^{-1}$ which is below the maximum permissible FAO limit ($< 100 \mu\text{g L}^{-1}$) for As in irrigation water; thus the final treated water found suitable for irrigation in agricultural crops.



Weed-based phytoremediation system developed at ICAR-DWR and irrigation of vegetables through treated water

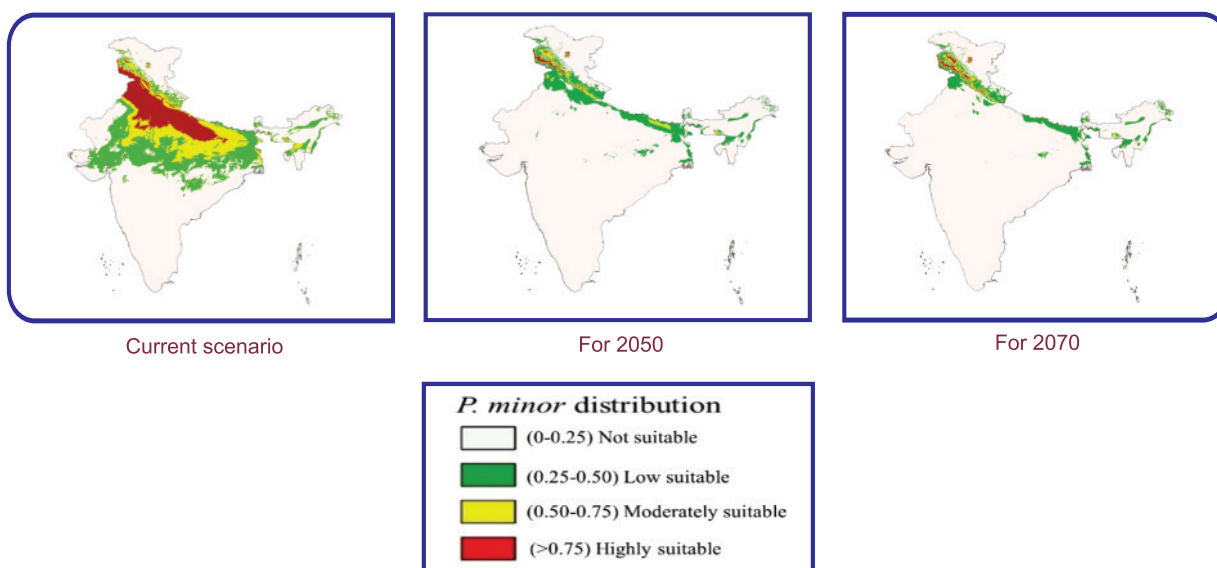
Chloroplast genome sequence of *Parthenium* analysed

For understanding the chloroplast genome structure, gene organization, elucidating the evolutionary relationship among the asteraceae family members and for creation of genomic resources, chloroplast genome sequence of *Parthenium hysterophorus* was analysed. The complete chloroplast genome of *P. hysterophorus* was obtained from NCBI (Acc No. MT576959.1). Sequence analysis of the chloroplast genome showed that it has a typical quadripartite structure of 151,912 bp, consisting of two copies of inverted repeat (IRa and IRb) regions of 25093 bp separated by one LSC region of 83,607 bp and one SSC region of 18,122 bp. A total of 37 SSRs were predicted in the chloroplast genome of *P. hysterophorus* out of which 12 primer pairs were synthesized, 5 pairs (SSR PhSSR 3, 5, 9, 10 and 12) were able to generate clear bands by PCR.

Circular gene map of chloroplast genome of *P. hysterophorus* genes

Future projections of weed severity

- Species distribution modelling was done to project the invasion potential of *Phalaris minor* in India under current as well as future climatic conditions under Representative Concentration Pathways (RCPs) 4.5 and 8.5 for the years 2050 and 2070.
- Northern part of India was found to provide an ideal climate for *P. minor* in current climatic conditions. It was observed that invasion hotspots for *P. minor* were shifted towards the north of the country including few North-eastern parts in all four future climatic scenarios.

Projected distribution of *Phalaris minor* under future climatic scenarios (RCP 4.5)

E. Environmental Impacts of Herbicides and Mitigation Measures

Method for Determination of Carfentrazone-ethyl and its Degradation in Wheat under Elevated CO₂ Conditions

A LCMS/MS method was developed for simultaneous determination of degradation of carfentrazone-ethyl and its degradation metabolites (2RS)-2-chloro-3-(chloro 5-(4-(difluoromethyl)-5-oxo-4,5 dihydro 1H-1,2,4 triazol-1-yl)-4-fluorophenyl) propionic acid and α , 2-dichloro-5[4-(difluoromethyl)-4,5-dihydro-5-oxo-1 H-1,2,4- triazol-1-yl]-4-fluorobenzoic acid in soil and wheat plants at 1X and 2X dose under elevated CO₂ conditions. Degradation of carfentrazone-ethyl and its degradation products was found to be less under elevated CO₂ (550 \pm 50 ppm) than ambient condition. Through this method degradation of carfentrazone and its three degradation metabolites was easily determined in soil and wheat under CO₂ stress conditions.

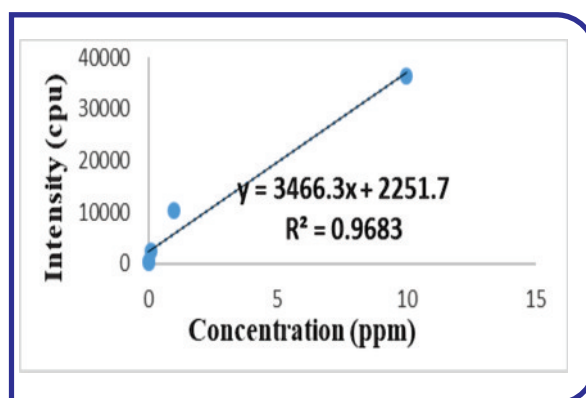
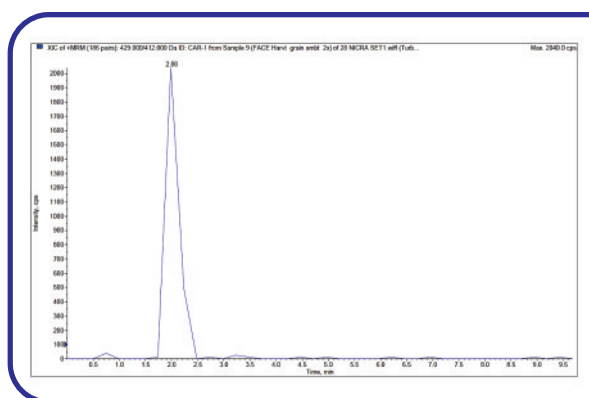
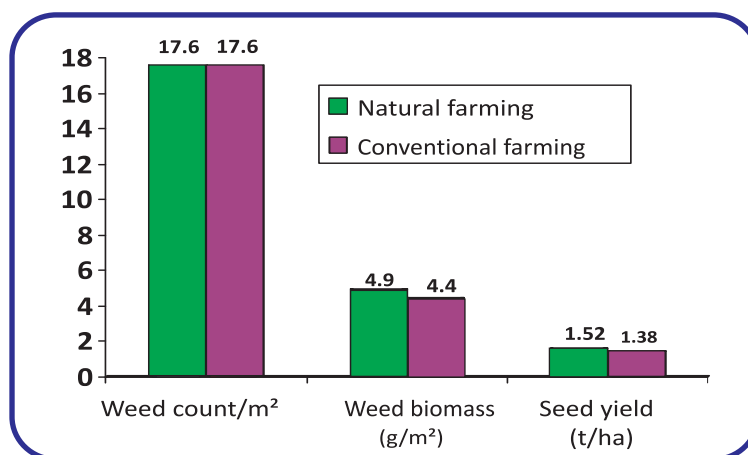


Fig. Carfentrazone residues in wheat grain at harvest by LCMS/MS and five points calibration curve for carfentrazone (0.001 to 10 ppm level) by LC-MS/MS

Weed Management in Natural Farming System

Established a demonstration plot (0.5 acre) on Natural Farming. Greengram was taken as the first crop (summer 2022). Initial studies revealed that the seed yield of greengram as well as weed population density in NF was at par with conventional system.



F. Capacity Development and Farmers Outreach Activities

- During the year 2022-23, a total of 18 training programmes (1700 participants) and 65 Front-line Demonstrations & On-farm Trials were conducted for the farmers and other stakeholders. A total number of 800 farmers were directly benefitted under different programmes such as Farmers FIRST, Biotech KISAN Hub, *Mera Gaon Mera Gaurav* and Scheduled Caste Sub-Plan. In addition, 14 nos. of Kisan Mobile Sandesh containing real time agricultural information and customized knowledge on weed management technologies were delivered to the registered farmers (23000) for taking timely action to manage weeds. Besides, 123 success stories of farmers were also documented.
- Due to intervention through Farmers FIRST programme, 90% of the fallow areas after wheat harvest have been brought under crop diversification by introducing summer green gram and blackgram (from 350 acres in 2017 to 2400 acres in 2022) in the adopted villages and surrounding areas. Similarly the area under hybrid rice has also increased to a large extent due to FFP.
- A nationwide programme on "*Parthenium* Awareness Week" was organized during 16-22 Aug., 2022 to make public aware of the ill effects of *Parthenium* and ways to control it. All SAUs, 80 other universities, 101 ICAR institutes, 700 KVKs, 152 municipalities, 200 school and colleges, 95 District Panchayat, 18 NGOs, 7 ICFRE Institute, 30 PCCF participated in this programme apart of uploading on DWR Website, Facebook and Twitter. On this occasion, five national webinars, one live programme and two training programme were organized. It is estimated that more than one million people have been made aware under this campaign through direct interactions and print & electronic media.
- The demonstrations of application of nano-urea in wheat, chickpea and field pea through drones were conducted during *Rabi* 2022-23 in different villages of Panagar, Sihora, Patan and Shahpura of Jabalpur district adopted under FFP, MGMG and SCSP programmes. More than 1250 acres area were completed under drone spraying.



Economic impact of herbicide uses in field crops: A case study from central India

- An economic benefit estimation of herbicide use has been carried out for eight districts of Jabalpur agricultural division in rice, wheat, maize and greengram with the help of Joint Director, Deputy Director, and block-level offices of the Department of Agriculture, Government of Madhya Pradesh.
- In terms of herbicide use, rice recorded the largest area (7.68 lakh ha) followed by wheat (7.28 lakh ha). However, in terms of the percentage of the total cropped area, maize recorded the highest coverage in herbicide use (73%) followed by greengram (68%).
- Economic benefits accrued due to herbicide use over farmer's practice was maximum in greengram (₹ 9,400/ha) followed by maize (₹ 8,400/ha) and rice (₹ 7,600/ha).



G. Linkages and Collaborations

To widen the scope of weed research, ICAR-DWR signed MoUs with following institutions.

- RDVV, Jabalpur on 06th January, 2022
- Mata Gujri College, Jabalpur on 4th May, 2022
- aIDEA, NAARM, Hyderabad, on 14th May 2022
- Tara Blooms, Coimbatore on 1st March, 2023



MoU with RDVV, Jabalpur



MoU with NAARM Hyderabad

In addition, 04 new contract research projects funded by different herbicides industries and other organizations were undertaken by the Directorate during 2022-23.

S.No.	Project title	Duration	Budget (in lakh)	Funding agency
1	Evaluation of premix herbicide formulation paraquat dichloride 22.4% + oxyfluorfen 1.99% EW + synergic agent in non - cropped areas	2022-2023	6.49	Tropical Agrosystem (India) Pvt Ltd, Chennai
2	Biological control of aquatic weed <i>Salvinia molesta</i> in STPS reservoir at Sarni, Betul (MP)	2022-2023	49.97	STPS, Sarni (MP)
3	Baseline study of herbicides resistance in grassy and broad leaf weeds in maize and soybean ecosystem in India	2022-2023	24.60	Syngenta India Limited, Pune
4	Evaluation of bioefficacy and phyto - toxicity of topramezone 336 g/l SC against weeds complex in chickpea and its residual effect on succeeding crops	2022-2024	11.89	BASF India Ltd., Navi Mumbai, Maharashtra

H. राजभाषा कार्यान्वयन

खरपतवार अनुसंधान निदेशालय में दिनांक 14-29 सितम्बर 2022 तक हिन्दी पखावाड़ा आयोजित किया गया। हिन्दी पखावाड़े के दौरान निदेशालय में विभिन्न प्रतियोगिताओं, आलेखन एवं टिप्पण, तात्कालिक निबंध लेखन, हिन्दी शुद्धलेखन, कम्प्यूटर में यूनिकोड पर टाइपिंग, आशुभाषण (तात्कालिक भाषण), विजय कार्टेस्ट एवं वाद-विवाद का आयोजन किया गया। निदेशालय द्वारा प्रकाशित “तृण सन्देश” पत्रिका का विमोचन भी किया गया। भारतीय कृषि अनुसंधान परिषद नई दिल्ली द्वारा खरपतवार अनुसंधान निदेशालय को वर्ष 2020-2021 के दौरान राजभाषा हिन्दी के प्रयोग-प्रसार के क्षेत्र में सर्वाधिक एवं सराहनीय कार्यों के लिए राजर्षि टंडन राजभाषा पुरस्कार का प्रथम पुरस्कार एवं निदेशालय की पत्रिका “तृण सन्देश” के लिए गणेश शंकर विद्यार्थी हिन्दी पत्रिका पुरस्कार प्रदान किया गया। नगर राजभाषा कार्यान्वयन समिति, कार्यालय क्रमांक-2 द्वारा वर्ष 2021 के दौरान राजभाषा हिन्दी के प्रयोग-प्रसार के क्षेत्र में सर्वाधिक एवं सराहनीय कार्यों के लिए खरपतवार अनुसंधान निदेशालय को लगातार द्वितीय वर्ष भी सम्मानित किया गया।



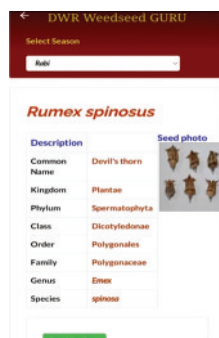
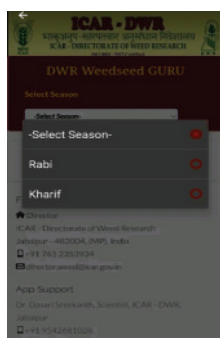
I. Publications

Directorate published 47 Research papers/review articles in journals of national and international repute, 03 Books, 10 Books chapters, 04 Newsletters, 35 Popular articles, 02 Souvenir, 02 Technical Bulletin, 01 Information Bulletin, 01 Training manual and 01 Hindi magazine (*Trin Sandesh*).



J. Mobile App

The ‘DWR Weedseed GURU’ mobile app is a user-friendly application that enables users to identify weed seeds through the selection of images on their smartphones. The application comprises a comprehensive database of seed photographs and taxonomic details of 82 *Kharif* and 38 *Rabi* season weeds commonly found in agricultural fields.



K. Recognitions

The Directorate received two prestigious ICAR awards namely *Rajarshi Tandon Rajbhasha Award* and *Ganesh Shankar Vidyarthi Hindi Magazine Award*, Appreciation certificate from NARAKAS, Jabalpur, and ranked 37th position among all the ICAR institutes. In addition, several awards and recognitions have been received by the scientists during 2022 - 23.



Rajarshi Tandon Rajbhasha Award



Ganesh Shankar Vidyarthi Hindi Magazine Award

1	Dr. Pijush Kanti Mukherjee: Outstanding Achievement Award - 2021 by GKV Society, Agra during 18 - 20 February, 2022 and ISWS - Fellow Award at 3 rd International Weed Conference held at Anand Agricultural University, Anand, Gujarat, India during 20-23 December, 2022.
2	Dr. Yogita Gharde: Best Poster Presentation during 8 th International Conference on Plant Pathology: Retrospect and Prospects during March 23-26, 2022 and Dr. V.P. Tyagi Memorial Award-2022 (GAFFEF-2022) at Institute of Forestry, Tribhuvan University, Pokhara, Campus Pokhara, Nepal during September 17-19, 2022.
3	Dr. Deepak Vishwanath Pawar : Innovative Biotechnologist Award and Young Scientist Award on the occasion of World Bio - Sciences Congress 2022 during April 14-17, 2022.
4	Er. Chethan, C.R.: First prize in Oral Presentation during 26 -27 May, 2022 at ICAR-CIAE, Bhopal and ISWS Dr. T.V. Muniyappa Young Weed Scientist Award at the 3 rd International Weed Conference held at Anand Agricultural University, Anand, Gujarat, India during 20-23 December, 2022
5	Dr. Dasari Sreekanth: Best Paper Presentation Award for oral presentation in the International Conference on Recent Advances in Research and Innovations in Life Sciences during 17-19 November 2022.
6	Dr. V.K. Choudhary: Best Poster Award at 3 rd International Weed Conference held at Anand Agricultural University, Anand, Gujarat, India during 20 - 23 December, 2022 and International Conference on Pulses held at NASC, New Delhi during 10 - 12 February, 2023
7	Dr. Himanshu Mahawar: Best Poster Award at 3 rd International Weed Conference held at Anand Agricultural University, Anand, Gujarat, India during 20 - 23 December, 2022.
8	Dr. J.S. Mishra and Dr. V.K. Choudhary: Sriram Khad Patrika of the Fertilizer Association of India.
9	Mr. Veer Singh, Mr S.K. Bose, Mr. Nemichand Kurmi and Mr. Mohan Lal Dubey received Medals in Carom, Chess and Race events in ICAR Central Zone Annual Sport Meet during 3-6 January 2023 at Indore.



Dr. J.S. Mishra receiving Shriram Khad Patrika Award



Dr PK Mukharjee receiving ISWS Fellow



Dr Chethan C.R. receiving ISWS Young Scientist Award



Mr Nemichand Kurmi receiving Gold Medal in 1500 meter race

L. Promotion of Millets

Prior to the year-long celebration of 'International Year of Millets 2023' eight millets (sorghum, pearl millet, finger millet, foxtail millet, barnyard millet, little millet, kodo millet, proso millet) were demonstrated at the Directorate during *Kharif*2022 to make the people aware of the millets as health food. The Directorate also organized a training-cum-interface meeting on '*Advanced cultivation and importance of Millets (Shri Anna)*' under Scheduled Castes sub-plan on 8th February, 2023, which was attended by 120 participants including farmers from millet growing areas of Madhya Pradesh.



M. Seed Production

In order to increase farm revenue and to provide quality seeds to the farmers, the Directorate has signed MoU with Madhya Pradesh State Seed and Farm Development Corporation for large-scale seed production of rice, wheat, pulses and oilseeds. During 2022-23, a total of 167.2 tonnes of certified seed of rice 77.4 t (Sahabhagi), wheat 58.7 t (MP 3382), mustard 9.9 t (PM 30), chickpea 15 t (RVG 202) and greengram 6.2 t (Virat), were produced.



N. New Facilities

During 2022-23, new facilities/equipments/vehicles/farm implements, such as Weather station, Plant growth chamber, Spectrophotometer, Indo ArcGIS, Plotter, Electronic balances, CO₂ analyser sensors, Dry bath, Tissue culture racks, Staff car, Tractor, Tractor mounted sprayer, Rotavator, Fire extinguisher, Lightning arrester, Irrigation pipes, Registration of old HIG quarters, Computers and ACs, etc, were created.



Automated Weather Station



Plant Growth Chamber



Staff Car



Tractor

O. Revenue Generation

During 2022-23, the Directorate generated total revenue of Rs. 67.29 lakhs from various sources such as sale of farm produce, guest house, herbicide testing, etc.

P. Budget Utilization

The Directorate utilized 100% of its budget as per RE of 2022-23.

Head of expenditure	Budget received (RE)*	% of expenditure
ICAR-DWR		
Grantin-Aid-Capital	67.46	100
Grantin-Aid-General	366.89	100
AICRP-WM		
Grantin-Aid-Capital	22.80	100
Grantin-Aid-General	66.46	100
Non Scheme General	30.00	100
Grand Total	553.61	100

* excluding salary

Q. Annual Sport

The DWR athletes participated in ICAR Central Zone Annual Sport Meet during 3-6 January 2023 at Indore, and received medals in various sport categories.



R. Important Meetings/Conferences Organized

Name of activity	Date and venue
XXIX Annual Review Meeting of AICRP Weed Management	25-27 May, 2022; Tamil Nadu Agricultural University, Coimbatore.
30 th Institute Management Committee meeting	04 th November, 2022; ICAR -DWR Jabalpur
3 rd International Weed Conference	20-23 December, 2022, Anand Agricultural University, Anand, Gujarat
Research Advisory Committee Meeting	22-23 February, 2023; ICAR- DWR Jabalpur



XXIX Annual Review Meeting of AICRP-Weed Management



30th Institute Management Committee meeting



Research Advisory Committee Meeting



3rd International Weed Conference



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