

मात्र कार्यालयीन उपयोग हेतु
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कार्यवृत्त Proceedings

अखिल भारतीय समन्वित खरपवार प्रबंधन परियोजना
की XXVI वार्षिक समीक्षा बैठक

**XXVI Annual Review Meeting of
All India Coordinated Research
Project on Weed Management**

स्थान
असम कृषि विश्वविद्यालय, जोरहट (असम)

15–16 अक्टूबर, 2019

Venue

Assam Agricultural University, Jorhat (Assam)

15-16 October, 2019



भा.कृ.अनु.प.-खरपतवार अनुसंधान निदेशालय
जबलपुर-482 004 (म.प्र.)
ICAR-Directorate of Weed Research
Jabalpur - 482 004 (M.P.)
(ISO 9001:2015 Certified)



**Proceedings of
XXVI Annual Review Meeting
All India Coordinated Research Project on Weed Management
15-16 October, 2019
Assam Agricultural University, Jorhat (Assam)**

15 October, 2019

INAUGURAL SESSION

Inaugural session was graced by the presence of Dr. J.K. Deka, Dean, FA, AAU, Jorhat, Dr. M. Saikia, I/C DR (Agri), AAU, Jorhat; Dr. Shobha Sondhia, I/C AICRP-WM, ICAR-DWR, Jabalpur; Dr. I.C. Barua Principal Investigator, AICRP-WM, AAU, Jorhat centre and chaired by Dr. P.K. Singh, Director, ICAR-DWR, Jabalpur. Dr. S.S. Kohle, Former Director, Instructions, IGKV, Raipur and Dr. V.P. Singh, Principal Scientist & HOD, Crop Production ICAR-IISR, Lucknow were invited as resource persons for this meeting. Scientists of 17 regular AICRP-WM coordinating centres, two volunteer centres attended the meeting along with scientist from ICAR-IIPR and ICAR-IVARI.

Dr. P.K. Singh., Director, ICAR-Directorate of Weed Research, Jabalpur welcomed the Chief Guest and participants during inaugural function. In his welcome address Dr. Singh highlighted the role of AICRP-WM in crop and cropping system. He also highlighted losses caused by the weeds to the tune of 11 billion US dollar annually in major crops. Dr Deka highlighted weed flora shift at farmer fields. He said that climate change and raise in temperature, erratic rains aggravated weeds problem. For the control of alien invasive weeds, biosafety and bio-security law should be enforced in the country. He also said that conservation agriculture is an answer for soil management but it also resulted in new dimension of weeds, some weed disappeared and some have come up. Weed management under GM and HRC crop is also challenging.

During the programme AICRP-WM ‘Best Centre Awards for the year 2018-19’ was given to CCSHAU, Hisar.

In the inauguration ceremony, following publications were released:

“AICRP-Weed Management Annual Report 2018-19” by ICAR-Directorate of Weed Research, Jabalpur

Bulletin “Weed Control Recommendations for Crop Production in Assam Agriculture University” by AICRP-WM AAU, Jorhat centre

Bulletin “Success Story on Biological Control of water hyacinth by *Neochetina* spp. by AICRP-WM RVSKVV, Gwalior centre

Extension folder “Scientific technique for Sweetcorn Production” in Hindi by AICRP-WM RVSKVV, Gwalior centre

Video CD “Biological Control of water hyacinth by *Neochetina* spp. by AICRP-WM RVSKVV, Gwalior centre

Extension Bulletin “*Faslon ke mukhya kharpatwaar aur unki roktham*” in Hindi by AICRP-WM CCSHAU, Hisar centre

Leaflets in Hindi for control of weeds in different crops, viz. wheat, pulses and oilseeds, mustard, vegetables, cotton, sugarcane by AICRP-WM CCSHAU, Hisar centre

Leaflets on “*Parthenium*: National weed its effect and integrated weed management, *Ambrosia psilostachya*: An invasive weed, Weed management of invasive weeds in field crops and Wealth of weeds” in Kannad by AICRP-WM UAS, Bengaluru centre.

In the inaugural session, vote of thanks was proposed by Dr. I.C. Barua, PI, AICRP-WM AAU, Jorhat Centre.

TECHNICAL SESSION - I

Presentation of salient findings of AICRP-WM Centres

- Chairman** : Dr. M. Saikia, I/C Director Research, AAU, Jorhat
Resource persons : Dr. S. S. Kohle, Former Director Instructions, IGKV, Raipur
Dr. V.P. Singh, Pr. Scientist & HOD, Crop production, ICAR-IISR, Lucknow
Rapporteurs : Dr. Dibakar Ghosh, ICAR-DWR, Jabalpur
Dr. Roshan Choudhary, MPUAT, Udaipur

Dr Sushilkumar, Principal Scientist (Entomology) presented Salient research achievements of ICAR-Directorate of Weed Research, Jabalpur.

Dr. Shobha Sondhia, Incharge AICRP-WM, ICAR-DWR presented the research highlights of the AICRP-WM network experiments and showed continuous progress in research and extension activities and number of publications. She also presented Action Taken Report (ATR) on recommendation and comments made in the XXV Annual Review Meeting of AICRP-WM organized at GBPUAT, Pantnagar during 7-8 June, 2018.

Afterwards as per schedule presentation by PIs of AICRP-WM co-ordinated centres were made.

PJTSAU, Hyderabad

Dr. M. Madhavi, Principal Investigator, presented research highlights of Hyderabad centre

- Infestation of new weed *Spirodela polyrhiza* in rice field is reported.
- In CA experiment, adoption of IWM practices emitted higher amount of GHGs as compared to sole herbicidal approach. It may be due to the soil disturbance during integrated approach, but a reverse trend was noticed in different tillage practices.
- Among weed management practices, considerably higher energy input was required in chemical weed management. IWM resulted in significantly higher energy output, energy use efficiency and energy productivity.
- In 4th year of experimentation of aerobic rice, decrease in population of *Aeschynomene* spp and *Alternanthera paranychioides* was noticed, where as occurrence of *Dinebra retroflexa* and *Chloris barbata* was noticed.

Comments

- All observations mentioned in the network program should be recorded by the centre regarding CA experiment.
- Mention date and time of application of herbicide and duration in days and time for residue and microbial analysis in different experimentation.
- Submit annual report in time and follow the guidelines while presenting the data.

- Under CA experimentation, different soil parameters along with carbon sequestration need to be studied properly.
- The rainfall data should also be mentioned.
- Practice of seedbed should be mentioned.
- Residual analysis of herbicides in soil should also be done at harvest stage and the data should be taken at 15 DAS, 30 DAS....up to harvest.

UAS, Bengaluru

Dr. G.N. Dhanpal, Principal Investigator presented research highlights of Bengaluru centre:

- Presence of new quarantine weed species *Ethulia gracilis* was observed in the state.
- Effect of leachate of *Alternanthera philoxeroides* (alligator weed) in controlling water hyacinth (*Eichhornia crassipes*) under lab study.
- Among tillage, zero tillage had slightly lower weeds density and dry weight of weeds followed by permanent bed at all stages and the difference being at 60 DAS, under Maize based cropping system in conservation agriculture.
- The weed index was higher in stale seed bed technique (63.1%) than straw mulching (34.7%) under non - chemical methods of weed management in *Kharif* - Foxtail millet (*Setaria italica* (L.) P. Beauv.) – *Rabi*- Greengram

Comments

- House suggested to submit the details of report and photographs regarding the presence of *Ethulia gracilis* by the centre in collaboration with other expert. House also suggested to mention proper source of information and GPS based location and photographs before reporting to AICRP annual report.
- Repeat experiment on controlling of *Eichhornia crassipes* (water hyacinth) by *Alternanthera philoxeroides* leachates and give quantitative data before any conclusion recommendation.
- Annual report is not prepared as per said guidelines.
- While presenting the data proper statistical analysis and right type of transformation is required before presentation of data under different experimentation.
- In many experiment data table was not presented.
- Using photos from internet should be avoided.
- Take the experiment in seek plot technique. Repeat the water hyacinth control experiment, take some quantitative data and then report it.
- Mention the straw load used under CA experiments.

KAU, Thrissur

Dr. Meera V Menon, Principal Investigator presented research highlights of Thrissur centre:

- Due to flood during *kharif* 2018 experiments was not performed properly.
- Upcoming problem of *Sacciolepis interrupta* in transplanted rice at farmer's field.
- Weed DMP was less in pyrazosulfuron ethyl and highest grain yield and B:C ratio was for treatment pretilachlor + bensulfuron methyl *fb* cyhalofop butyl + penoxsulam *fb* hand weeding under the experiment on management of *Sacciolepis interrupta* in rice.

Comments

- The number of experiments conducted was less. It was suggested to increase number of experiments in vegetable or plantation crops under organic farming programme.
- Mention chemical name of the herbicide instead of trade name during presentation.

- In tables transformed values not matched with original ones, it should be rechecked.
- Use mechanical weeders for controlling the weeds under organic agriculture.
- Preparation of the annual report should be based on the guidelines provided.
- Check the *statistical data* given in the table.

TNAU, Coimbatore

Dr. P. Murli Arthanari, Principal Investigator presented research highlights of Coimbatore centre:

- Shifting of weed flora under long-term rice experimentation, and *Leptochloa chinensis* is becoming a major weed in rice.
- Residue of oxyfluorfen was not detected in soil as well as plant top, in onion bulb, 0.018 mg/kg was recorded which were below the MRL of 0.05 mg/kg.
- Better WCE & higher productivity was found in ZT+R - ZT + R and PE pendimethalin 1.0 kg/ha + HW 45 DAS in Sunflower , and ZT + R – ZT + R and PE atrazine 0.5 kg/ha + HW 45 DAS in Maize
- SOC & soil nutrients status was not influence under maize – sunflower – *dhaincha* based conservation agriculture system.

Comments

- Use cyhalofop-butyl + penoxsulam in place of previous herbicide for controlling *Leptochloa chinensis* in rice.
- Residual value should be rechecked in case of 2, 4-D.
- Safety precautions should be taken while applying the herbicides/ agricultural chemicals.
- Bring out quality publication
- Observation on weed parameters should be taken species wise to get actual picture regarding the effect of different weed management practices on weeds.
- Use small tools and implements under CA.

TECHNICAL SESSION - II

Presentation of salient findings of AICRP-WM Centres

- Chairman** : Dr. Deepak Borah, Professor Entomology, AAU, Jorhat
- Resource persons** : Dr. S. S. Kohle, Former Director Instructions, IGKV, Raipur
Dr. V.P. Singh, Pr. Scientist & HOD, Crop production, IISR-ICAR, Lucknow
- Rapporteurs** : Dr. Arvind Verma, MPUAT, Udaipur
Dr. (Mrs) Parvinder Kaur, PAU, Ludhiana

RVSKVV, Gwalior

Dr. Varsha Gupta, Assistant Professor presented research highlights of Gwalior centre.

- In pearl millet-mustard-cowpea system
 - Under conservation agriculture CT-CT gave maximum yield of mustard.
 - In case of cowpea (ZT+R – ZT +R – ZT) proved better yield.
 - In pearl millet, CT – ZT and CT- CT obtained better yield response.
- In weed management in organic farming system, two hand weeding at 20 and 40 days after sowing resulted in maximum yield response of greengram -potato cropping system.
- In weed management of sweetcorn under organic cropping system, intercrop of greengram with sweetcorn gave maximum grain yield.
- *Oldenlandea corymbosa* and *Euphorbia geniculata* were observed in pearl millet field.

- Biological control of Water hyacinth by *Neochetina* spp. exhibited very good results in natural water body of the town.

Comments

- At ARM and other important forum, PI should present the data.
- In CA experiment, among tillage and residue management, the treatment number one T₁ should be written in proper pattern like CT - CT to be written as CT – CT – F.
- Check the dose of herbicides used in cowpea in pendimethalin + imazethapyr.
- In FLD, the farmers' practices need to be specified.
- Better to calculate the weed index (WI) along with WCE.
- Centre should maintain biological control of water hyacinth by releasing new population of beetles on quarterly basis.
- Search for new perennial pond to take care of water hyacinth problem.
- Soil solarisation treatment should be followed as per technical guidelines of the treatment. UV stabilized plastic mulch should be used.
- Graphical and tabular representation of the data was not proper.
- While presenting the data original as well as transformed data should be included.
- Take quality photos and in the presentation photos should be more specific.

AAU, Jorhat

Dr. I. C. Barua, Principal Scientist & Principal Investigator presented research highlights Jorhat centre.

- *Ageratum houstonianum*, *A. conyzoides*, *Polygonum* sp. *Cynodon dactylon*, *Digiteria setigera*, *Echinochloa crus-galli*, *Eleusine indica* were major weeds in DSR.
- *Cyperus iria*, *Fimbristylis littoralis*, *Monochoria vaginalis*, *Sagittaria gyayanenus* were dominant weeds in transplanted rice.
- Pyrazosulfuron 25 g/ha + 2, 4 D 0.5 kg/ha rotated with pretilachlor 0.750 kg/ha significantly reduced the weed density, dry biomass accumulation and enhanced grain yield during autumn season in rice-rice cropping sequence.
- In on farm trials on blackgram and greengram, application of pendimethalin 750 g/ha as pre-emergence showed superiority over farmer package.
- The grain yield of rice in rice- greengram - manure cropping system increased significantly under MT (DSR) and CT (TR) compared to CT (DSR).
- In chilli, rice straw mulching followed by one hand weeding resulted in high yield and the results of oxo-biodegradable plastic fill mulching were at par with it.
- *Micandra physaloides* a newly appeared broad leaf weed has been reported.

Comments

- In biological studies of weeds, *Mikamia micrantha* is not to be considered as emerging weed as it is very old weed and considered as important weed of the zone.
- ATR was not presented; it is important and necessary to present.
- Seed yield should be expressed in t/ha if the value is more than 1000 kg's.
- Check rice straw yield it is presented as 23333??
- The word microgram per gram should be replaced with the (µg/g) in residue study.
- Present residue data as per instructions.
- Citronella mulch should be used after extraction of essential oils from the leaves, so that it will give additional economic benefit.
- Residue analysis of herbicides should be done using standard protocol and half life of pemdimehalin need to recheck.
- Data should be presented with proper statistical analysis.

- Dose of imazethapyr should be 70 g/ha instead of 80 g/ha.
- Prepare digitized weed herbarium of 200 weeds by the end of December 2019.

OUAT, Bhubaneswar

Dr. M.M. Mishra, Agronomist & Principal Investigator presented research highlights of Bhubaneswar centre

- *Ageratum conyzoids* was severe problem in the state.
- Post-emergence application of tembotrione 100 g/ha or topramezone 25 g/ha recorded lowest weed index and highest maize cob yield.
- CT-ZT- ZT recorded significantly higher grain yield in rice-maize-cowpea system.
- In onion application of pendimethalin followed by quizalofop -p-ethyl gave high yield and recorded lowest weed density.
- Application of sulfosulfuron 25 g/ha at 25 and 50 DAS was found to be very effective in controlling *Orobanche* population. The treatment of application neem cake 200 kg/ha at sowing *fb* pendimethalin 1.0 kg/ha as pre emergence at 3 DAP found to be the best treatment in reducing the population of *Orobanche*.

Comments

- The unit of yield should be taken as (t/ha) if the yield levels are more than 1000 kg/ha.
- In FLDs and OFRs, the area should be mentioned in hectares and not to use acre as unit of area.
- Always take photographs with date and time so that it can give the idea of weather condition of that time.
- In CA experiments, check the values of soil properties given.
- Improve quality of slides.
- The dose of herbicides presented should be properly checked and must be presented as per guidelines.
- Check dose of atrazine.
- The values related to soil parameters including bulk density need to recheck with proper justification.
- The bulk density values in ZT-ZT-ZT treatments are higher than the CT treatments, verify the data.
- The results of water hyacinth control in *Rabi* season was not given in the annual report but presented in ARM.
- Try to select the perennial pond and take the reading quarterly.
- The area should be mentioned in hectares.

BCKVV, Kalyani

Dr. Bikas Madal, Associate Professor (Agronomy) & Principal Investigator presented research highlights of Kalyani centre

- In rice- rapeseed- greengram cropping system under CA, pretilachlor 0.75 kg/ha followed by bispyribac-sodium 25 g/ha + mechanical weeding at 50 DAT gave lowest weed number and biomass and highest grain yield.
- Pendimethalin 0.75 kg/ha followed by quizalofop was effective in cowpea.
- Fluchloralin 1.0 kg/ha followed by hand weeding was effective for control of weeds in cabbage.
- In spring planted sugarcane, the highest weed control efficiency was found in the treatment T₄ (Atrazine 1.0 kg/ha PRE – 3DAS + Hand Weeding at 30 DAS) followed by T₈ (Sesbania co-culture followed by 2, 4-D 1.0 kg/ha at 40 DAS).

Comments

- Mention units in data table in presentation.
- Verify the data of guava presented in guava based intercropping system under organic farming. Do not give the B: C ration of guava cultivation treatments for initial years.
- Data on economics in horticultural crops particularly fruit crops should be given after the start of fruiting.
- In biological control of water hyacinth, follow the guidelines of observation taken on crop damage and also the results should be supported with good photographs. Discuss with Dr. Sushil Kumar for clarity and data recording for water hyacinth.
- Intercrop yield should be represented as equivalent yield.
- Data should be presented with proper transformation and statistical analysis.
- Units of weed density and weed dry weight should be mentioned.
- Infer the data in 3-4 lines for clarity.
- Meteorological data of new experiment should be presented in brief.
- Good work is being carried out at centre however, presentation need improvement.
- In OFR trials farmers practice need to specify.

TECHNICAL SESSION - III

Presentation of salient findings of AICRP-WM Centres

- Chairman** : Dr. J. Deka, Dean, Faculty of Agriculture, AAU, Jorhat
- Resource persons** : Dr. S. S. Kohle, Former Director Instructions, IGKV, Raipur
Dr. V.P. Singh, Pr. Scientist & HOD, Crop production, ICAR-IISR, Lucknow
- Rapporteurs** : Dr. M. Madhavi, PJTSAU, Hyderabad
Dr. V. Meera Menon, KAU, Thrissur

AAU, Anand

Dr. B.D. Patel, Principal Investigator presented research highlights of Anand centre

- High infestation of *Argemone mexicana* was observed after harvesting of *Rabi* crops in different parts of Gujarat.
- *Neochetina* beetles obtained from DWR were released in a water hyacinth infested pond.
- Significantly the highest seed cotton yield (1.81 t/ha) was obtained under zero tillage with residue. Conventional tillage and zero tillage practices recorded equal seed cotton yield (1.66 t/ha) and found to be significantly superior over other tillage practices.
- The impact of different tillage and weed management practices was found to be significant with respect to recording weed density and weed dry biomass of monocot, dicot, sedges and total weeds at 30 DAS in cotton under CA experiment on cotton-greengram system.
- Significantly higher (984 kg/ha) haulm yield was observed under zero tillage with residue as compared to other treatment except zero tillage treatment (918 kg/ha).

Comments

- The picture of *Commelina benghalensis* have been wrongly labeled and advised to check.
- The yield data should be expressed in t/ha if the value is more than 1000 kg's.
- Proper monitoring is required on *Neochetina* weevils released for water hyacinth control.
- Check the data presented in the tables.
- Safety precautions should be taken while applying the herbicides/ agricultural chemicals.
- Mention dominated weed flora and weed index in the experiments while presenting data.

- Give specific conclusion/recommendation after data tables of each experiment.
- Release fresh culture of beetles at appropriate time in the pond having water hyacinth and monitored water hyacinth control properly with support of quality photographs.

IGKV, Raipur

Dr. Srikant Chitle, Principal Investigator presented research highlights of Raipur centre

- *Alternanthera triandra* spread in around 70% area in state and has emerged as a serious weed in cropped fields especially in direct seeded rice and non cropped area
- Aggressive appearance of *Celosia argentea* was noticed, which caused serious suppression of other weeds due to insufficient rains.
- After completion of three cycles of weed management in rice- wheat- cowpea cropping system under conservation agriculture there is weed shift of annual grassy (*Echinochloa colona*) and broad leaf weeds to perennial weed like *Cynodon dactylon* especially under ZT (DSR) +R-ZT+R-ZT and ZT (DSR) - ZT+R-ZT.
- No significant difference in weed dry weight was recorded due to various organic nutrient management sources. Application of 50% N (FYM) + 50% N (poultry manure) + *Azospirillum* + PSB produced significantly higher grain yield. However, in WM practices, the maximum grain yield was found in the application of oxadiargyl 80 g/ha fb bispyribac Na 25 g/ha which was significantly superior to rest of the treatments under rice-sweet corn system.
- Among weed management practices black polythene mulch gave the highest net return and B:C ration followed by hand weeding twice in organically grown direct seeded aromatic rice- sweet corn cropping system, sweet corn (Rabi 2017-18)

Comments

- Correction was pointed out that Farmers practice was to be compared with other treatments in OFR and not in FLD.
- Calculate B: C ratio based on national perspectives.
- In conservation agriculture experiment, the B:C ratio was too high, it needs to recheck
- The units of expressing various parameters in the tables were not included.
- In the experiment on direct-seeded aromatic rice – sweet corn cropping system, the highlighting of herbicidal treatments should be avoided as it is organic farming experiment.
- Complete the duration of the experiment and then give the recommendation.
- Centre needs lots of improvement.
- Expedite Development of Mobile App in regional language/ Hindi.

PDKV, Akola

Dr. J.P. Deshmukh, Principal Investigator presented research highlights of Akola centre

- Heavy infestation of *Cuscuta* sp in some pocket of Western and Central Vidarbha zone (Akola, Buldana Amravati Dist, Yeotmal & Wardha Dist) in Soybean, Pigeonpea, Greengram
- *Parthenium* replaced by *Cassia tora* in Western and Central Vidarbha region.
- Use of two harrowing by tyne harrows and a blade harrow (CT) instead of roto-till (MT) and zero-till (ZT) in combination with herbicide application (IWM) provide added productivity and economic security in vertisols under soybean - chickpea sequence under conservation agriculture.
- Among the herbicidal treatments, atrazine 1.0 kg/ha PE fb HW at 40 DAS followed by tembotrione + atrazine (120+500 g/ha) POE fb IC + HW at 40 DAS (T10) and topramezone + atrazine (25.2+500 g/ha) POE fb IC + HW at 40 DAS proves better in controlling weed dry matter accumulation, weed control efficiency, weed index, economic returns and B:C ratio in maize.

- The integrated use of straw mulch either with pendimethalin 1 kg/ha or by metribuzin 0.7 kg/ha or atrazine 0.75 kg/ha (0-5 DAP) fb straw mulch 10 t/ha (10 DAP) fb one HW (75 DAP) was found very effective for weed control and for attaining the highest productivity and profitability in turmeric.

Comments

- GPS location of the new weeds identified in survey area is essential.
- Confirm the identification of *Anisomeles indica* as the picture presented resembled with *Hyptis suaveolence*.
- There is no need to go for OFR with pendimethalin in cotton as it is very old herbicide.
- *Striga asiatica* was reported to occur in rice should also be specified. Report on *Striga* spp infestation needs to be revalidated in collaboration with ICAR-DWR, Jabalpur.
- In future work such infestation may be reported with proper GPS location along with good photograph.

MPUAT, Udaipur

Dr. Arvind Verma, Principal Investigator presented research highlights of Udaipur centre

- Total weed density at 60 DAS and at harvest attained highest in the treatment maize (ZT)-wheat (ZT) - greengram (ZT) and lowest in maize (ZT+R)-wheat (ZT+R) - greengram (ZT+R) in maize in maize- wheat cropping system under conservation agriculture systems.
- Minimum total weed dry matter was observed under maize (ZT)-wheat (ZT) - greengram (ZT). Minimum number of monocot and dicot weeds was observed by application of sulfosulfuron + Metsulfuron at 30 + 2 g/ha at 30 DAS followed by hand weeding at 50-55 DAS in wheat in wheat-maize system under CA.
- Plastic mulch in different combinations proved most effective and recorded about 90% reduction in total weed dry matter at 60 DAS and at harvest, in comparison to weedy check in organically grown sweet corn.
- Maximum seed yield (1.4 t/ha) of fennel was recorded with crop sown with treatment of soil solarization with plastic mulch, which was at par with plastic mulch with either summer ploughing or stale seed bed.
- *Rottboellia exaltata* has become a serious weed of maize in Railmagra tehsil of Rajsamand.
- The estimated area of *Orobanche* spp. infestation in the district is about 2000 ha and it cause yield losses in the range of 20-50% in solanaceous vegetables.

Comments

- It was pointed out to check the spellings of scientific names of weeds.
- The centre was advised to check the dosages of herbicides tembotrione (120 g/ha), imazethapyr+ imazomox (70g/ha) and quizalofop ethyl (50g/ha) which were presented either as lower or higher doses.
- Proper source of nutrients should be mentioned under organic farming experiment.
- While presenting the data, uniform units should be used and should be as per guidelines.
- Tembotrione, topromezone and atrazine and their combinations were seemed to be used in maize and attempts should be made to estimate the residue build up in the soil.
- The help of the Botanical Survey of India could be sought if experts are not available.
- Proper identification of new weeds should be done along with GPS location and good photograph should be given.

TECHNICAL SESSION - IV

Presentation of salient findings of AICRP-WM Centres

- Chairman** : Dr. S. S. Kohle, Former Director Instructions, IGKV, Raipur
- Resource persons** : Dr. V.P. Singh, Pr. Scientist & HOD, Crop production, ICAR-IISR, Lucknow
- Rapporteurs** : Dr. I.C. Barua, AAU, Jorhat
Dr. T. Ram Prakash, PJTSAU, Hyderabad

CCSHAU, Hisar

Dr. S.S. Punia, Principal Investigator presented research highlights of Hisar centre

- In Rice-wheat CA system, retention of residue halts the diurnal fluctuation in temperature compared to conventional tillage in wheat. Soil temperature was higher and lower (0.5-1.5 °C) during morning and afternoon in zero tillage with full rice residue retention under both the conditions i.e. with or without waste decomposer compared to conventional tilled wheat, respectively. Under un-weeded situations, the emergence of *P. minor* was low under ZT wheat with residues (7.6-9.7/m²) as compared to ZT/CT wheat without residues (15.2-30.6/m²).
- In greengram, post emergence application of Aciflourfen + clodinafop at 245-370 g/ha proved very effective against *Digera arvensis* and *T. portulacastrum* but its efficacy against *C. rotundus* was poor. No carry over effect of Aciflourfen + clodinafop was found on succeeding mustard. Pyroxasulfone alone at 127.5 and 150 g/ha and its combination with pendimethalin proved very effective against all weeds with no toxicity.
- In vegetable peas, pre-emergence application of pendimethalin + imazethapyr (RM) at 1250 g/ha provides an effective and economical control of weeds in field pea without any phytotoxicity on the crop.
- New weed broadleaf weed *Oenothera laciniata* was observed to infest Guava and Ber orchards in sandy soils of RRS, Bawal area of Haryana
- Pre-emergence application of pendimethalin + pyroxasulfone (RM) at 1500+102 g/ha either alone or followed by sequential use of pinoxaden 60 g/ha/, meso+iodosulfuron (RM) 14.4 g/ha at 35 DAS caused significant reduction in density of *P. minor* and provided 83-93 % control against cross resistance *P. minor*.

Comments

- Executive summary in Hindi language should be included in the annual report.
- Studies on biological control of water hyacinth should be initiated in any perennial pond infested with water hyacinth and *Parthenium* control using *Zygogramma*.
- Alternative herbicides for glyphosate should be identified as several states are banning or restricting use of glyphosate.
- Farmers should be sensitized about using proper nozzles for spray of pre and post emergence herbicides and avoiding faulty herbicide application practices to derive optimum weed control efficiency.
- ATR was not presented in the ARM.
- Give data in table also in the presentation which is also mandatory to present during ARM.
- Previous year recommendation was not followed in case of CA experimentation where green manuring was suggested to take as third crop in summer. Green manure can be killed with application of 2, 4-D or grass cutter.

PAU, Ludhiana

Dr. (Mrs.) Parvinder Kaur, Asstt. Residue Chemist presented research highlights of Ludhiana centre

- In rice-wheat-green manure cropping system under CA, In PTR, the rice grain yield with recommended herbicide and IWM was significantly more to that of unsprayed control. All tillage and residue management treatments gave statistically similar wheat grain yield. ZT wheat (+R) – ZT DSR (+R) gave the highest net returns. Residues of metribuzin and clodinafop applied to wheat and pendimethalin and bispyribac sodium applied to rice were BDL in soil and grains.
- In organically grown basmati rice-durum wheat cropping system, deep tillage + green manure 100 kg/ha + normal plant density + one hoeing gave highest rice grain yield. Bed planting + 25% higher plant density + one hoeing gave the highest wheat grain yield.
- Pre-emergence application of pendimethalin 750 g/ha + pyroxasulfone 102 g/ha alone, or in sequence with either clodinafop 60g + metsulfuron methyl 4 g/ha or mesosulfuron 12 g+ iodosulfuron 2.4 g/ha as post-emergence gave effective control of *P. minor* and significantly increased the wheat grain yield than unsprayed check.
- Addition of β -cyclodextrin, chitosan and β -cyclodextrin-chitosan biocomposite to soil increased dissipation of imazethapyr and residues were BDL in 7 to 21 days
- The residues of butachlor, pretilachlor, anilophos, clodinafop, sulfosulfuron, metsulfuron-methyl and pendimethalin in soil, water and crop samples collected at harvest from farmer's fields.

Comments

- Specify LOQ for different herbicides in residue studies for different sample matrices.
- New formulation of pendimethalin should be used in place of old herbicide pendimethalin.
- No data was given in the presentation.
- Statistically analysed data should be presented along with the conclusions.
- Specify value of below detection limit (BDL) of each herbicide in each crop.
- As specified compile data on dominant cropping systems under CA experiment as 3-4 years/cycles by December 2019.
- Release fresh culture of beetles at appropriate time in the pond having water hyacinth and monitored water hyacinth control properly with support of quality data and photographs.

CSKHPKV, Palampur

Dr. Neelam Sharma, Principal Investigator presented research highlights of Palampur centre

- In maize-wheat cropping system under conservation agriculture, no significant variation in wheat grain equivalent yield due to tillage and weed management treatments. However, higher wheat grain equivalent yield in CT-ZT followed by CT-CT. CT-ZT recorded highest net returns which remain statistically alike to ZT-ZT whereas weed management treatments could not significantly affected the net returns.
- Under organically managed maize – garlic cropping system, intercropping and intensive cropping; raised stale seed bed + mulch or hoeing may be an effective mean of suppressing weeds and increasing garlic bulb equivalent yield. Pendimethalin residues in soil and garlic crop produce were below detectable levels ($< 0.05\mu\text{g/g}$). The atrazine residues in post harvest soil and maize grain were below detectable levels ($0.001\ \mu\text{g/g}$).
- IWM studies in orchards showed that, cultivation and imposition of treatments brought down weed diversity from 33 species to 7 species. Maximum peach yield was recorded in legume intercropping treatment which was at par with the manual weeding, fodder intercropping and glyphosate
- In turmeric, pre-emergence application of pendimethalin 1.0 kg/ha or metribuzin 0.7 kg/ha fb mulch (2 DAP) fb hoeing (75 DAP) could be an effective integrated weed management strategy.
- Residues of applied herbicides in soil and rhizomes of turmeric were found below detectable levels.

Comments

- B:C should be included in CA experiment results
- If available, a perennial pond infested with water hyacinth should be identified and biological control of this employing the *Neochetina* weevil should be demonstrated
- Occurrence of *Ammania baccifera* should be confirmed in wetland areas of HP and the species should be identified properly
- Font size in the slide was too small to follow
- Statistically analysed data should be included in the presentation.
- No need to perform statistical analysis in case of economic indicators such as cost of cultivation, net return, etc.
- Using of the faulty spraying techniques should be avoided.
- The yield data should be expressed in t/ha if the value is more than 1000 kg's.

SKUAST, Jammu

Dr. B.R. Bazaya, Principal Investigator presented research highlights of Jammu centre

- In rice-wheat-greengram cropping system under conservation agriculture, ZT-wheat + Crop residue with integrated weed management (sulfosulfuron + metsulfuron 30+2 g/ha at 30 DAS *fb* HW at 45 DAS) gave higher grain yield and B: C ratio in wheat with lowest weed density and weed biomass. In rice, highest net returns and B: C ratio were recorded in ZT-DSR+R with integrated weed management (pendimethalin @ 1 kg/ha as PE *fb* bispyribac-sodium 25 g/ha at 25 DAS *fb*. HW at 45 DAS).
- In basmati rice-potato-French bean cropping system under organic farming, mustard seed meal 2.5 t/ha at 10 DBS/DBT *fb* one hand weeding at 30 DAS/DAT was found effective in reducing weed population and weed biomass and gave higher yield of rice-potato-frenchbean.
- Highest grain yield was recorded with soil solarisation *fb* 1 mechanical weeding at 30 DAT which was statistically at par with stale seedbed+1 hand weeding at 30 DAT and stale seedbed *fb* 1 mechanical weeding at 30 DAT in basmati rice-broccoli-sesbania (green manure) cropping system under organic farming.
- Polythene mulch reduced weed density and weed biomass and produced higher fruit yield however, among herbicidal treatments, atrazine 2 kg/ha + paddy straw mulch *fb* non-selective herbicide (glyphosate 1%) found suitable for the weed management in kinnow basins

Comments

- Experimental data should reflect the collaborations made with other research institutes
- Proper technique for soil solarization treatment needs to follow.
- The experiments collaborated with other institutes should be reported in the annual report.
- While taking photographs, care should be taken to justify the treatment properly.

GBPUAT, Pantnagar

Dr. V.P. Singh, Principal Investigator presented research highlights of Pantnagar centre

- In conservation agriculture experiment highest wheat grain yield was recorded in conventional tillage of rice and wheat without *Sesbania* incorporation (GM) was found at par with conventional DSR *fb* conventional wheat along with *Sesbania* (incorporated).
- Adoption of intercropping of DSR + Soybean (FIRBs) under stale seed bed *fb* one hoeing+one HW; Wheat+ Mentha (FIRBs) *fb* one HW obtained higher yield in non-chemical weed management options in rice-wheat cropping system experiment
- Pendimethalin + metribuzin *fb* clodinafop + MSM (RM); pendimethalin + metribuzin > pendimethalin *fb* clodinafop+ MSM were very effective in management of cross resistance of *Phalaris minor* in wheat.

Comments

- Budget balance should be reconciled with ICAR-DWR to arrive at accurate budget balance
- A perennial pond infested with water hyacinth should be identified and biological control of this employing the *Neochetina* weevil should be demonstrated
- Details of activities undertaken in stale seedbed should be described, especially when solarization is adopted in a cropping system.
- Weed free treatment should be specified.
- A pond needs to be identified to show water hyacinth control using biological approach.
- While presenting the data, unit should be given as per guidelines.
- The B: C ratio should be mentioned in the table.

October 16, 2019

TECHNICAL SESSION - V

Presentation of salient findings of AICRP-WM Volunteer Centres and ICAR Institutes

- Chairman** : Dr. V.P. Singh, Pr. Scientist & HOD, Crop production, ICAR-IISR, Lucknow
- Resource persons** : Dr. S. S. Kohle, Former Director Instructions, IGKV, Raipur
- Rapporteurs** : Dr. Rabiratna Dash, OUAT, Bhubaneswar
Dr. V.K. Choudhary, ICAR-DWR, Jabalpur

BAU, Sabour

Dr. B. Kumar, Principal Investigator presented research highlights of Sabour centre

- In aerobic rice, pre-emergence application of pyrazosulfuron 20 g/ha *fb* post-emergence application of bispyribac sodium 25 g/ha was found to be the best herbicides in sequence for controlling the complex weed flora.
- In chickpea, out of several herbicides tested, the application of topramezone 25 g/ha as post-emergence was recorded better result in minimizing the weed flora with higher seed yield.

Comments

- In chickpea, study needs to be repeated for confirmation and also to take the other bio-efficacy and herbicide residue parameters under study.
- Guidelines should be followed while mentioning herbicide name and dose.

PAJNCOA&RI, Puducherry

Dr. P. Sarvanane, Principal Investigator presented research highlights of Puducherry centre

- In aquatic weed survey, *Eichhornia crassipes* is found to be the most dominating species in Karaikal district of Pondicherry. Similarly, *Sphaeranthus indicus* was observed in the rice fields after the crop harvest during the weed monitoring in Karaikal region.
- Higher germination and vigour index of blackgram was observed with the application of zinc nano-particles at 1.0 g/L concentration, which was biosynthesized from a weed i.e. *Tridax procumbens*.

Comments

- Centre was appreciated for good work and it was suggested to try *Neochetina* spp. for water hyacinth control.

ANGRAU, Guntur

Dr. (Mrs.) B. Pramilarani, Principal Investigator presented research highlights of Guntur centre

- Weed shift is observed in rice-fallow-blackgram cropping system. New weed species like *Vicia*, *Cardiospermum* & *Cuscuta* were observed in blackgram.
- In horsegram, the application of pendimethalin + imazethapyr 750+50 g/ha as pre-emergence spray was observed to be the best herbicide in managing the weeds.

Comments

- Focused research work to be planned as per the need of the state.

ICAR-IVRI, Izatnagar

Dr. P.K. Mukherjee, Principal Scientist presented research highlights of ICAR-IVRI, Izatnagar

- The detailed biology and its endozoochory dissemination pattern of the *Rumex dentatus* weed in fodder crops were studied.
- The introduction of Hybrid Napier Bajra as good perennial fodder for enhancing the lactation period as well as higher weed smothering ability.
- The severity of Fall army worm (FAW) in fodder maize was also raised and discussed. It was mentioned that FAW could not be controlled even by the spraying of new generation herbicides.

ICAR-IIPR, Kanpur

Dr. N. Kumar, Principal Scientist presented research highlights of ICAR-IIPR, Kanpur

- The detailed scenario of pulse production in the country and the role of ICAR-IIPR in this regard were discussed.
- The importance of pulses in conservation agriculture vis-à-vis weed management were discussed.
- Screening of pea and lentil germplasms for herbicide tolerance are being conducted were discussed.

Comments

- The residue of Topramezone in chickpea need to be tested in grain and soil.

ICAR-NBAIM, Bengaluru

Dr. P. Sreerama Kumar, Principal Scientist presented research highlights of ICAR-NBAIM, Bengaluru

- Apart from the established bio-agents like *Neochitina* weevil & *Zygogramma* beetle in weed control, some newly introduced bio-agents like *Smicronyx lutulentus* beetle against *Parthenium* weed to be explored.
- *Cecidochara connexa*, a gall fly against *Chromolena* may be tested in different locations.

Discussions

- Director, Dr. P.K. Singh has expressed to help those volunteer centres to enhance the financial grant in the best possible way in the next financial year on the basis of their performance.

Comments

- Other options of biological control of problematic weeds may be tried.

TECHNICAL SESSION–VI

Farmers interface meeting

Chairman	:	Dr. P.K. Singh, Director, ICAR-DWR, Jabalpur
Co-chairman	:	Dr. R.P. Dubey, Principal Scientist, ICAR-DWR, Jabalpur Dr. Shobha Sondhia, Principal Scientist & I/C AICRP-WM, ICAR-DWR, Jabalpur
Coordinator	:	Dr. I.C. Barua, AAU, Jorhat
Rapporteurs	:	Dr. B.R. Bazaya, SKUAST, Jammu Dr. Varsha Gupta, RVSKVV, Gwalior

The farmers of Distt. Jorhat were attended the meeting. At the outset Dr. P.K. Singh welcomed all the farmers coming from the different villages of Jorhat district. Around 25 farmers were participated in the meeting. During the meeting Dr. P. K. Singh briefed about the Annual Review Meeting of Weed Management and highlighted the various outcomes emerged out by the different coordinating centres to the farmers. During the interaction with farmers it was came in the knowledge that most of the farmers are using broadcasting method of the sowing. During the meeting farmers raised the following problems

- Grassy weeds specially *Setaria* spp a big problems in the rice field
- No training facility is available for the farmers.
- Lacking of smart tools using for weeding
- Farmers are facing weed problems in vegetable crops also.
- Lacking of skill knowledge about the application of herbicides etc.

After discussion with farmers the following suggestions were came by the experts

- Use the mechanical/small tools to control the weeds like cono -weeder and power weeder
- Use the water hyacinth as a mulch to control the weeds in vegetable crops
- Waste material of vegetable crops can be used to make vermicompost/composting.
- Use the optimum dose of herbicides at right time.
- Take precautions during the application of herbicides in the field.
- Use of different herbicides for different crops was suggested.
- Different training programmes are required to upgrade the knowledge and socioeconomic status of the farmers of Jorhat district.

During the meeting farmers informed the experts that they have not a problem of *Parthenium* weed at Jorhat district except roadside areas which is the most problematic weed of the country. In the end of the meeting the chairman Dr. P.K. Singh, Director, ICAR-DWR, Jabalpur distrusted the literature related to the weed control written in local language to every farmer who attended the meeting.

At the end of the interaction meeting Dr. I.C. Barua gave the vote of thanks to the farmers.

TECHNICAL SESSION–VII

In this session, general discussion on functioning of AICRP-Weed Management was held. It was informed by Dr PK Singh, Director, ICAR-DWR, Jabalpur to the house and PIs that this year almost all the centre are in comfortable budget position under the salary head. Sufficient budget is being given under Research contingency and TA head. It was also discussed to enhance budget for voluntary centre who are regular and actively conducting network experiments and participating in ARM.

PLENARY SESSION

Chairman : Dr. A.K. Pathak, Retd. Director of Research, AAU, Jorhat

Co-chairman : Dr M Saikia, Director Research, AAU, Jorhat

Dr P.K. Singh

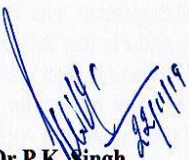
Dr Shobha Sondhia


Dr I.C. Barua

Plenary session was graced by Dr. A.K. Pathak, Retd. Director of Research, AAU, Jorhat and Dr M Saikia, Director Research, AAU, Jorhat. Dr P.K Singh, Director ICAR-DWR presented an overview of activities of two dates. Dr. Singh briefed about salient findings and weed management outcomes emerged out by this project. He further said that all the scientists of weed management team are working with their expertise to increase the income of farmer. It was opined that after new weed emergence, focus should be on management of that weed. Meeting was ended with proposal of vote of thanks by Dr Shobha Sondhia, In-charge, AICRP-Weed Management.

Recommendations

1. During spraying of herbicide safety precautions, used correct nozzles and right method of application should be followed.
2. While presenting the data, unit should be given as per guidelines.
3. The B: C ratio should be mentioned in the table.
4. Data under collaborative experimental with other institutions/AICRPs should also be given in the annual report and presented during ARM reflecting the collaborations made with other research institutes
5. Mention chemical name of the herbicide instead of trade name during presentation.
6. Preparation of the annual report should be strictly based on the guidelines provided.
7. Always take photographs with date and time so that it can give the idea of weather condition of that time.
8. New weed species or weed infestation must be reported with proper GPS location along with good photograph.
9. Executive summary in Hindi language should be included in the annual report by all the centre.
10. While presenting the data original as well as transformed data should be included.
11. Weed data transformation $\sqrt{(X+0.5)}$ or $\sqrt{(X+1.0)}$ should be adopted uniformly by all the centres.
12. Whenever, weed-free treatment is maintained in any experiment, details of the activities adopted should be described.
13. Each experiment raw data should be submitted through online data management system from Rabi 2019-20 onwards.
14. Submit AUC in the prescribed format only.


Dr P.K. Singh
Director, ICAR-DWR, Jabalpur


Dr Shobha Sondhia
Principal Scientist and In-charge, AICRP-Weed
Management

**XXVI ANNUAL REVIEW MEETING OF
ALL INDIA COORDINATED RESEARCH PROJECT ON WEED MANAGEMENT**

ICAR - DIRECTORATE OF WEED RESEARCH, JABALPUR

15-16 OCTOBER, 2019

VENUE: ASSAM AGRICULTURAL UNIVERSITY, JORHAT (ASSAM)

PROGRAMME

October 15, 2019 (Tuesday)

0830-0930 hrs

REGISTRATION

1000-1100 hrs

INAUGURAL SESSION

1100-1115 hrs

HIGH TEA

1115-1330 hrs

TECHNICAL SESSION – I

Chairman	Dr. M. Saikia, I/C Director Research, AAU, Jorhat
Rapporteurs	Dr. Diwakar Ghosh, ICAR-DWR, Jabalpur Dr. Roshan Choudhary, MPUAT, Udaipur
Salient research achievements of ICAR-DWR during 2018-19	Dr. Sushilkumar, Principal Scientist, ICAR – DWR, Jabalpur
Salient achievements of AICRP on Weed Management	Dr. Shobha Sondhia, Principal Scientist, In-charge, AICRP – Weed Management, ICAR-DWR, Jabalpur
Action Taken Report of previous Annual Review Meeting	Dr. Shobha Sondhia, Principal Scientist, Incharge, AICRP – Weed Management, ICAR-DWR, Jabalpur
	Presentation of salient findings by Principal Investigators of AICRP-WM Centres
	PJTSAU, Hyderabad
	UAS, Bengaluru
	KAU, Thrissur
	TNAU, Coimbatore

1330-1430 hrs	LUNCH BREAK
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1430-1545 hrs	TECHNICAL SESSION – II
Chairman	Dr. Deepak Borah, Professor Entomology, AAU, Jorhat
Rapporteurs	Dr. Arvind Verma, MPUAT, Udaipur Dr. (Mrs) Parvinder Kaur, PAU, Ludhiana
	Presentation of salient findings by Principal Investigators of AICRP-WM centres
	RVSKVV, Gwalior

	AAU, Jorhat
	OUAT, Bhubaneswar
	BCKV, Kalyani

1545-1600 hrs	TEA BREAK
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1600-1645 hrs	TECHNICAL SESSION – III
Chairman	Dr. J. Deka, Dean, Faculty of Agriculture, AAU, Jorhat
Rapporteurs	Dr. M. Madhavi, PJTSAU, Hyderabad Dr. V. Meera Menon, KAU, Thrissur
	Presentation of salient findings by Principal Investigators of AICRP-WM Centres
	AAU, Anand
	IGKV, Raipur
	PDKV, Akola
	MPUAT, Udaipur

1645-1745 hrs	TECHNICAL SESSION – IV
Chairman	Dr. S. S. Kohle, Former Director Instructions, IGKV, Raipur
Rapporteurs	Dr. I.C. Barua, AAU, Jorhat Dr T. Ram Prakash, PJTSAU, Hyderabad
	Presentation of salient findings by Principal Investigators of AICRP-WM Centres
	PAU, Ludhiana
	GBPUAT, Pantnagar
	CSKHPKV, Palampur
	CCSHAU, Hisar
	SKUAST, Jammu

October 16, 2019 (Wednesday)

0930-1115 hrs	TECHNICAL SESSION –V
Chairman	Dr. V. P. Singh, Principal Scientist and HOD, Crop Production, ICAR-IISR, Lucknow
Rapporteurs	Dr. Rabiratna Dash, OUAT, Bhubaneswar Dr. V.K. Choudhary, ICAR-DWR, Jabalpur
	Presentation of salient findings by Principal Investigators of volunteer centres and ICAR institutes
	SVBPUAT, Meerut
	SKUAST, Srinagar
	BAU, Sabour
	COA, Pondicherry
	ICAR-CIARI, Port Blair

	UAS, Dharwad
	BUAT, Banda (U.P.)
	ANGRAU, Guntur
	ICAR-IVRI, Izatnagar
	ICAR Institutes

1115-1300 hrs	TECHNICAL SESSION – VI
	Farmers interface meeting
Chairman	Dr. P. K. Singh, Director, ICAR-DWR, Jabalpur
Co-chairman	Dr. R. P. Dubey, Principal Scientist, ICAR-DWR, Jabalpur Dr. Shobha Sondhia, Principal Scientist & I/C AICRP-WM, ICAR-DWR, Jabalpur
Coordinator	Dr. I. C. Barua, AAU, Jorhat
Rapporteurs	Dr. B.R. Bazaya, SKUAST, Jammu Dr. Varsha Gupta, RVSKVV, Gwalior

1300-1400 hrs

LUNCH BREAK

1400-1430 hrs	TECHNICAL SESSION –VII (General discussion, financial issues, interaction with herbicide industry etc.)
1430-1700 hrs	CONCLUDING / PLENARY SESSION (Presentation of summary recommendations)

**XXVI Annual Review Meeting
All India Coordinated Research Project on Weed Management
ICAR-Directorate of Weed research, Jabalpur-482004**

Venue : Assam Agricultural University, Jorhat (Assam)

Date : 15-16 October, 2019

LIST OF PARTICIPANTS

EXTERNAL EXPERTS

- | | | |
|----|----------------|---|
| 1. | Dr. S.S. Kolhe | Professor, Agronomy (Rtd.)
(Former Director Instructions, IGKV, Raipur)
S-2, Sector-1 Extn. Awanti Vihar,
Raipur (Chhattisgarh) |
| 2. | Dr. V.P. Singh | Principal Scientist & Head, Division of Crop
Production
Indian Institute of Sugarcane Research
Raibareli Road, P.O. Dilkusha,
Lucknow - 226 002 |

ICAR-DIRECTORATE OF WEED RESEARCH, JABALPUR

- | | | |
|-----|--------------------|---|
| 3. | Dr. P.K. Singh | Director |
| 4. | Dr. Shobha Sondhia | Pr. Scientist (Organic Chemistry) & I/C
AICRP-WM |
| 5. | Dr. SushilKumar | Pr. Scientist (Entomology) |
| 6. | Dr. R.P. Dubey | Pr. Scientist (Agronomy) |
| 7. | Dr. V.K. Choudhary | Sr. Scientist (Agronomy) |
| 8. | Dr. Dibakar Ghosh | Scientist (Agronomy) |
| 9. | Dr. Yogita Gharde | Scientist (Agril. Statistics) |
| 10. | Er. Chetan C.R. | Scientist (Agril. Engineering) |
| 11. | Mr. Sandeep Dhagat | Chief Technical Officer |
| 12. | Mr. Pankaj Shukla | Sr. Technical Officer |
| 13. | Mr. O.N. Tiwari | Sr. Technical Officer |

INVITEES FROM AICRP-WM CENTRES

**PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY
(PJTSU), HYDERABAD (TELANGANA)**

- | | | |
|-----|-------------------|---|
| 14. | Dr. M. Madhavi | Principal Scientist (Agro.) & Principal
Investigator |
| 15. | Dr T. Ram Prakash | Jr. Residue chemist |

ANAND AGRICULTURAL UNIVERSITY, ANAND

- | | | |
|-----|--------------------|-------------------------------------|
| 16. | Dr. B.D. Patel | Agronomist & Principal Investigator |
| 17. | Mr. D.D. Chaudhari | Jr. Agronomist |

TAMILNADU AGRICULTURAL UNIVERSITY, COIMBATORE

18. Dr. P. Murali Arthanari Principal Investigator
19. Dr. C. Bharathi Jr. Residue Chemist

CCS HARYANA AGRICULTURAL UNIVERSITY, HISAR

20. Dr. S.S.Punia Sr. Agronomist & Principal Investigator
21. Dr. Sushil Kumar Assistant Agronomist

RAJMATA VIJAYARAJE SCINDIA KRISHI VISHWA VIDYALAYA, GWALIOR

22. Dr. D.S. Sasode Agronomist & Principal Investigator
23. Dr. Varsha Gupta Jr. Agronomist

ODISHA UNIVERSITY OF AGRICULTURE & TECHNOLOGY, BHUBANESHWAR

24. Dr. M.M. Mishra Agronomist & Principal Investigator
25. Dr. R. Dash Jr. Agronomist

PUNJAB AGRICULTURAL UNIVERSITY, LUDHIANA

26. Dr (Mrs) Parvinder Kaur Residue chemist

G.B. PANT UNIVERSITY OF AGRICULTURE & TECHNOLOGY, PANTNAGAR (U.P.)

27. Dr. V. Pratap Singh Professor (Agronomy) & Principal Investigator
28. Dr. T.P. Singh SRO, Agronomy
29. Dr. S.P. Singh SRO, Agronomy

CSK HIMACHAL PRADESH KRISHI VISHVAVIDHYALAYA, PALAMPUR

30. Dr. (Mrs) Neelam Sharma Residue Chemist & Principal Investigator
31. Dr. S.S. Rana Agronomist

KERALA AGRICULTURAL UNIVERSITY, THRISSUR

32. Dr. V. Meera Menon Assoc. Professor (Agronomy) & Principal Investigator
33. Ms Sreelakshmi K Assistant Professor

ASSAM AGRICULTURAL UNIVERSITY, JORHAT

34. Dr. I.C. Barua Principal Scientist & Principal Investigator
35. Dr. M. Saikia I/C Director Research
36. Dr. Deepak Borah Professor Entomology
37. Dr. J. Deka Dean, Faculty of Agriculture

38.	Mr. M.J. Konwar	Jr. Scientist (Agronomy)
39.	Dr. Kalyan Pathak	Pr. Scientist, DoR (Agri)
40.	Dr. P.C. Bora	Professor & Head, Agronomy
41.	Dr. B.C. Sarma	HOD, Agril. Engg.
42.	Dr. P. Mishra	HOD, Extension Education
43.	Dr. R.K. Sharma	Professor, AEFM
44.	Dr. B. Gogoi	Scientist (Soil), AICRP-IFS
45.	Dr. N. C. Deka	Professor Agronomy
46.	Dr. N. Borah	Professor Soil Science
47.	Dr. Khagen Kurmi	Professor Agronomy
48.	Dr. Jogesh Goswami	Professor Agronomy
49.	Dr. Karuna Kanti Sharma	Chief Agronomist, AICRP on IFS & AICRP on Forage Crops
50.	Ms. Mahima Begum	Jr. Scientist, AICRP on Potato
51.	Mr. J. Hazarika	Jr. Scientist, AICRP on IFS
52.	Mr. K. Choudhary	Jr. Scientist, AICRP on Irrigation Water Management
53.	Mr. J.R. Hazarika	Jr. Agronomist, AICRP on IFS
54.	Dr. Pranjit Sutradhar	Assistant Professor Agronomy
55.	Ms. Sontara Kalita	Assistant Professor Agronomy
56.	Ms. Kalpana Gogoi	Research Assistant, AICRP-WM
57.	Mr. Anjan Krishna Sarmah	Assistant Professor Agronomy
58.	Dr. J. Goswami	Professor Agronomy
59.	Ms. Rupalim Sarmah	JRF (Agronomy)

UNIVERSITY OF AGRICULTURAL SCIENCES, BENGALURU

60.	Dr. G.N. Dhanapal	Professor (Agronomy) & Principal Investigator
61.	Dr. (Mrs.) Kamala Bai S.	Jr. Agronomist

I.G. KRISHI VISHVA VIDYALAYA, RAIPUR

62.	Dr. Shrikant Chitale	Senior Scientist & Principal Investigator
63.	Dr. Nitish Tiwari	Jr. Agronomist

MAHARANA PRATAP UNIVERSITY OF AGRICULTURE AND TECHNOLOGY, UDAIPUR

64.	Dr. Arvind Verma	Professor (Agronomy) & Principal Investigator
65.	Dr. Roshan Choudhary	Jr. Agronomist

DR. PANJABRAO DESHMUKH KRISHI VIDYAPEETH, AKOLA

66.	Dr. J.P. Deshmukh	Assoc. Professor (Agronomy) & Principal Investigator
67.	Dr. S.U. Kakade	Jr. Agronomist

SHER-E-KASHMIR UNIVERSITY OF AGRICULTURAL SCIENCES AND TECHNOLOGY, JAMMU

68.	Dr. B.R. Bazaya	Sr. Scientist (Agronomy) & Principal Investigator
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69. Dr. Ramphool Puniya Asstt. Professor (Agronomy)

BIDHAN CHANDRA KRISHI VISWAVIDYALAYA, KALYANI

70. Dr. Bikas Madal Associate Professor (Agronomy) &
Principal Investigator

71. Dr. Smritikana Sarkar Jr. Agronomist

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