



# WEED news



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## From Director's Desk

Globalization and industrialization have made the paradigm shift in the socioeconomic consideration of the farming communities. Farmers of the present age mainly harp on the maximum productivity. However, the trouble with pest infestation is one of the major obstacles farmers are experiencing. Amongst them weeds are creating the havoc all over the world. They are silent killers of crop. Productivity goes down making the farmers baffled. The most damaging component of this weed community is a group of exotic weeds. Simply due to Parthenium we lose many of our useful plants and our domestic animals are too losing their grazing land. It imparts allergic health hazards to us, to our animals. Aquatic ecosystem is badly disturbed due to water hyacinth and other aquatic weeds all through the country from Loktak Lake to Narmada Basin, from Dal Lake to Kerala Back Waters. To combat the weeds of cropped area and even no cropped situation the use of herbicides is being increased day by day. That may result in stress for the environment in future. All together it is going to be a complex situation. All the stakeholders, from Government to farmers should act in tandem to come out from it.

## Research Notes

### Activation of systemic resistance in chickpea against *Cuscuta campestris*



Haustrorial initiation before the infection of *Cuscuta* on chickpea

*Pseudomonas fluorescens* and *Trichoderma viride* isolated from the native rhizosphere of chickpea were found to induce systemic resistance in chickpea against

*Cuscuta*. The microbes were applied as seed treatment and foliar application at 20 days and 45 days of sowing. The number of haustorial attachments were significantly less in the microbe treated plants leading to the increased life of the host plants. The defense enzymes viz., peroxidase, polyphenol oxidase and catalase were activated upon the application of the microbes. *T. viride* activated higher amount of polyphenol oxidase while *P. fluorescens* was

found to activate more of the other two enzymes.

- C. Kannan

### Organic weed management practices in rice-wheat cropping system

#### Direct seeded rice

During *kharif*, 2010 a field experiment in direct seeded rice was conducted with eight treatments, viz., FYM 10 t/ha + stale seed bed fb 1 HW 25 DAS; FYM 10 t/ha + stale seed bed fb reduced spacing (15 cm); FYM 10 t/ha + Sesbania incorporation 30 DAS (30 cm); FYM 10 t/ha + mechanical weeding 25 and 45 DAS (30 cm); FYM 10 t/ha + 2 HW 25 and 45 DAS; NPK (80-40-20) kg/ha, butachlor 2.0 kg/ha fb fenoxaprop 65 g/ha; 50% FYM + 50% NPK, butachlor 2.0 kg/ha fb HW 30 DAS and control. The major weed flora observed in the experimental field was *Echinochloa colona*, *Cyperus iria*, *Commelina benghalensis*. Results revealed that the lowest weed dry biomass at 60



DAS was recorded under the treatment FYM 10 t/ha with 2 HW (2.1 g/m<sup>2</sup>) followed by the treatments 50% NPK + 50% FYM with herbicide and 1HW (2.2 g/m<sup>2</sup>), FYM 10 t/ha with stale seed bed fb 1HW (2.5 g/m<sup>2</sup>) as compared to control (7.0 g/m<sup>2</sup>). However, the grain yield was highest (6647 kg/ha) under FYM 10t/ha with *Sesbania* intercrop incorporation as compared to control (3743 kg/ha).

### **Wheat**

The wheat crop in the sequence was taken with eight treatments, viz., FYM 10t/ha + stale seed bed fb 1 HW 25 DAS; FYM 10t/ha + stale seed bed fb reduced spacing (15 cm); FYM 10t/ha + berseem intercropping (30 cm); FYM 10 t/ha + mechanical weeding 25 and 45 DAS (30 cm); FYM 10 t/ha + 2 HW 25 and 45 DAS; NPK (120-60-40) kg/ha, clodinafop 60 g/ha + carfentrazone 20 g/ha; 50% FYM + 50% NPK, clodinafop 60 g/ha fb HW 45 DAS; control. Major weed flora observed in the experimental field was *Phalaris minor*, *Medicago denticulata* and *Chenopodium album*. The treatment of 50% FYM+50% NPK along with herbicide (clodinafop 60 g/ha) fb 1 HW in wheat significantly reduced the weed density and weed dry biomass at 60 days after transplanting. The wheat grain yield was highest (5273 kg/ha) under FYM 10t/ha with berseem intercrop as compared to control (1677 kg/ha).

- R. P. Dubey

### **Elevated CO<sub>2</sub>: Effect on crops and weeds**

Elevated CO<sub>2</sub> in the atmosphere may affect the growth and development, physiological and biochemical aspects of crops as well as weedy plants. To study this response in chickpea and four weed species (*Phalaris minor*, *Medicago denticulata*, *Chenopodium album* and *Lathyrus sativa*) an experiment was conducted in FACE (free air CO<sub>2</sub> enrichment) facility.

High CO<sub>2</sub> environment led to increase in overall growth of chickpea plants as well as all weed species at both the sampling stages i.e. 21 and 42 DAT. Overall promotion in growth of plants at elevated CO<sub>2</sub> was noticed in terms of higher branching and higher biomass production in chickpea and weed species. Plants of *Lathyrus sativa* appeared more robust at elevated CO<sub>2</sub> as compared to other weed species as this weed has tendency to spread which create hindrance in neighboring plants.

At elevated CO<sub>2</sub>, higher relative growths were observed in *Lathyrus sativa* as compared to chickpea and other weed species.

Increase in rate of photosynthesis and water use efficiency was observed in chickpea and all weed species when plants were subjected to CO<sub>2</sub> enrichment. On the other hand, stomatal conductance, rate of transpiration and transpiration cooling were decreased at elevated CO<sub>2</sub> as compared to that of ambient CO<sub>2</sub> in all the species. High growth of *Lathyrus sativa* at elevated CO<sub>2</sub> can be ascribed 'at least partly' to its ability to maintain high transpiration and transpiration cooling as compared to chickpea at high temperature at elevated CO<sub>2</sub>. However, this ability of this weed species might be considered as a potential threat to crop species like chickpea as it acts as drain of available resources. If it is so, then definitely crop-weed interaction will be changed in favour of weeds in high CO<sub>2</sub> atmosphere. Among all the species under study, highest activity of carbonic anhydrase enzyme at elevated CO<sub>2</sub> was noticed in *Lathyrus* showing again adaptive potential of *Lathyrus sativa* to climate change.

Differential regulation of a peptide (SDS-PAGE band) of about 26 KDa was evident in different plant species and with reference to CO<sub>2</sub> concentration. In chickpea and *Lathyrus*, high CO<sub>2</sub> concentration led to up-regulation of the peptide (26 KDa) as compared to that at ambient CO<sub>2</sub>, while such response was not evident in other weed species. Differential regulation of different isoenzymes (Native PAGE) of superoxide dismutase (SOD) and glutathione reductase (GR) was noticed among species at elevated CO<sub>2</sub>. Among all the weed species, *Lathyrus sativus* showed stronger antioxidant system in terms of SOD and GR while in *Chenopodium album* and *Phalaris minor*, downregulation of the isoenzymes of SOD as well as GR was noticed. Transcripts profile of genes involved in antioxidant defense system in chickpea revealed differential regulation of different genes at elevated CO<sub>2</sub> pointing out towards a possible role of antioxidant defense system in high CO<sub>2</sub> atmosphere which will be further confirmed in next season.

- Bhumesh Kumar and Meenal Rathore



## News

### ITMU: Introduction to IPR

The Institute Technology Management Unit (ITMU) organized a presentation on 'An introduction to intellectual property rights' on 25<sup>th</sup> July, 2011. Dr. Sushil Kumar, in-charge, ITMU welcomed Dr. A.R.G. Ranganatha, Director, DWSR and other scientists. Miss. Anupama Rajan, Research Associate, ITMU presented the topic lucidly covering the introduction on ITMU, its role in the institute and basics of intellectual property rights.

### Institute Research Council meeting

The meeting of IRC was convened under the Chairmanship of Dr. A.R.G. Ranganatha, Director on different dates from 29<sup>th</sup> June to 12<sup>th</sup> July, 2011. The Chairman briefed the house with his remarks emphasizing need of thorough discussion on the experiments and programmes. Stressed on consideration of up to date knowledge on the subject before undertaking a programme for preventing duplication and for their effective and proper execution to make them more relevant for the end users. Chairman reviewed the research work carried out by the scientists of the Directorate for the period 2010-11. All the scientists attended the meeting and presented their performed work and new technical programme for the period 2011-12. Dr. D. K. Pandey, Member Secretary coordinated the meeting.

### QRT meeting at Directorate

First meeting of the newly constituted QRT for DWSR including AICRP-Weed Control was convened on 4-6 September, 2011 at the Directorate. Dr. S.C. Modgal, Chairman, QRT along with other members Dr. B.C. Barah, Dr. M.K. Porwal, Dr. A.R.G. Rangnatha, Director and Dr. R.P. Dubey, Member Secretary and Dr. J.C. Dagar, ADG (NRM) attended the meeting. All the scientists presented the research findings of the projects undertaken for the last five years. QRT visited the research experiments in research fields, FACE and containment facility and laboratories. QRT also witnessed the demonstrations laid out by the Directorate in Magarmoha village where they interacted with the farmers.



### DWSR, IFFCO organized one day training programme

The DWSR and IFFCO jointly organized a day's training programme. Dr. A.R.G. Ranganatha, the Director of the institute was the chief guest on the occasion and a total of twenty



peasants from village Magarmoha, Luhari, Khamod, Khairi and Kakarheta and five from Magardha of Narsinghpur were selected for this programme. Dr. Ranganatha explained the importance of weed management and role of joint effort involving Institute's scientists and other organizations. He thanked IFFCO for their attempt to make a venture with DWSR. Deputy Manager, IFFCO narrated the necessity of such programme. Dr. V.P. Singh, Principal Scientist, DWSR explained the biology of weeds and their management. Dr. Anil Dixit gave a detailed account of safer herbicide use technique. Dr. Sushil Kumar emphasized on the utilization of weeds by different techniques. The programme was coordinated by Dr. P. K. Singh, Principal Scientist of this Directorate.



## हिन्दी पखवाड़ा

दिनांक 14 सितम्बर, 2011 से निदे ालय के सभागार में हिन्दी दिवस का आयोजन किया गया। जिसमें कार्यालय के समस्त अधिकारियों/कर्मचारियों ने भाग लिया। कार्यक्रम का उदघाटन भा.कृ.अनु.परि. के महिमा वंदन एवं प्रभारी निदे ाक महोदय डॉ. ए.आर.जी.रंगनाथा के कर कमलों से सरस्वती पूजन एवं दीप प्रज्ज्वलित कर किया गया। निदे ालय में पखवाड़े के दौरान विभिन्न प्रतियोगिताओं जैसे आलेखन एवं टिप्पण प्रतियोगिता, हिन्दी पत्र लेखन

प्रतियोगिता, हिन्दी शुद्धलेखन प्रतियोगिता, वाद-विवाद प्रतियोगिता एवं हिन्दी कविता पाठ प्रतियोगिताएं सम्पन्न कराई गईं। दिनांक 30 सितम्बर, 2011 को निदे ालय में हिन्दी पखवाड़ा समापन समारोह आयोजित किया गया। समारोह की अध्यक्षता निदे ालय के निदे ाक डॉ. ए.आर.जी. रंगनाथा ने की तथा कार्यान्वयन समिति की ओर से समिति के अध्यक्ष डॉ. वी. पी. सिंह ने सभी उपस्थित अधिकारियों/कर्मचारियों का स्वागत किया। समारोह में विभिन्न प्रतियोगिताओं के विजयी प्रतियोगियों को पुरस्कृत किया गया। वर्षभर हिन्दी में सर्वाधिक काम करने वाले अनुभागों (क्रय एवं भण्डार अनुभाग, कृषि अभियांत्रिकी अनुभाग एवं वित्त एवं लेखा अनुभाग) को पुरस्कृत किया गया। अंत में श्री जी.आर. डोंगरे ने सभी का आभार प्रर्द ान किया।



## Personalia

1. Dr. D. K. Pandey, Dr. V.S.G.R. Naidu, Dr. Bhumesk Kumar and Dr. Meenal Rathore attended the brain storming session on "Prioritisation of Plant Physiology and Biochemistry Research for 12<sup>th</sup> Five Year Period" held during 5.8.2011 and 6.8.2011 at Indian Agricultural Research Institute, New Delhi.
2. Dr. A.R.G. Ranganatha, Dr. D. K. Pandey and Dr. Bhumesk Kumar attended the National Consultation on Climate Change Resilient Agriculture" held at CRIDA, Hyderabad from 19.09.2011 to 20.09.2012.
3. Dr. P. K. Singh, attended *National Seminar on Innovative Extension Approaches for Enhancing Rural Household Income* held at JNKVV, Jabalpur from 27-29 Sept., 2011.

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