Asian-Pacific Weed Science Society

NEWSLETTER

July 2017

Volume 7: Issue 1

MESSAGE FROM EDITOR-IN-CHIEF

Dr. Bhagirath S. Chauhan
Queensland Alliance for Agriculture and Food Innovation (QAAFI)
The University of Queensland
Gatton, Queensland, Australia
b.chauhan@uq.edu.au

The newsletter of Asian-Pacific Weed Science Society (APWSS) for the month of July is out now. On behalf of APWSS, I am thankful to all the contributors and participants from different countries for their active involvement in this newsletter. Weed scientists and researchers are encouraged to send short insight articles covering personal views, new methods, and breaking news related to weed science and invasive plant management. The next newsletter will be published in December 2017, so please submit your contributions by 15th November 2017.

MESSAGE FROM Dr. HIROSHI MATSUMOTO (PRESIDENT, APWSS)

The Provost of Faculty of Life and Environmental Sciences, and Executive Officer of the University, University of Tsukuba, Ibaraki 305-8572, Japan.

Dear Colleagues,

We have very hot summer this year in Japan. Only 2 months left until 26th APWSS conference in Kyoto, Japan. As all of you may know, this is Golden Jubilee Memorial Conference for APWSS. We welcome all of you to Kyoto, a historic city in Japan.

The preparations for the conference came to a final stage. The organizing committee aims the conference to be a memorable one in providing valuable technical information and pleasure of local hospitality. We received 364 abstracts and nearly 150 of them are allocated for oral presentation. The two special publications to mark the Golden Jubilee of APWSS, i).“50th Anniversary Celebratory Volume Commemorating 50 Years 1967–2017” edited by Drs.. Nimal Chandrasena and A.N. Rao and ii). “Weed Management in rice in the Asian-Pacific Region” edited by Drs. A. N. Rao and H. Matsumoto are in preparation. The anniversary volume will be distributed to all participants and Rice Weed Management book is to be sold at a reasonably inexpensive price during the conference.

The conference website (http://www.c-linkage.co.jp/apwss2017/) is updated frequently. Please do obtain all the latest information from the website about the 26th APWSS Conference at Kyoto, Japan from September 19 to 22, 2017.

I am looking forward to seeing you in Kyoto.

Hiroshi Matsumoto
President, APWSS
Chairperson, 26th APWSS Conference, 2017

Pakistan

Sequential use of herbicides for weed management in dry direct-seeded rice

Muhammad SaqibGoraya

Department of Agronomy, TheIslamia University of Bahawalpur, Bahawalpur 63100, Punjab, Pakistan.
email: saqibgoraya@yahoo.com

Rice is a leading staple food of the world as it is used by more than half of the world population. It is grown on 161 million hectares worldwide, with an annual production of 678.7 million tons and 90% of which is grown and produced (143 M ha area with a production of 612 MT of paddy) in Asia. Direct seeded rice (DSR) is a good alternate of transplanted rice offering advantages of faster and easier planting, ensures proper plant population, and reduces labor and water requirement. A significant amount of water (35-57%) can be spared through the adoption of DSR. Although direct seeding of rice is a very successful rice growing technique, weeds are a major constraint to its sustainability. It is widely recognized that weeds not only compete with crops for nutrients, moisture, space and light but may also produce allelochemicals that may interfere with crop growth. Weeds in DSR germinate continuously due to repeated drying and wetting conditions which make them more serious. Repeated germination necessitates early and repeated weed control in direct-seeded aerobic rice. Herbicides provide effective and economical weed management in DSR.

Work at The Department of Agronomy, The Islamia University of Bahawalpur is in progress on the use of various herbicides for effective weed management in DSR. A trial was conducted on the sequential application of

bispyribac sodium, pretilachlor and bensulfuron methyl, alone and in various combinations during 2014 and 2015 to evaluate the effects on weed growth and grain yield of DSR. Sequential applications of bispyribac sodium + bensulfuron at 12 DAS and at 28 DAS resulted in reduced weed population and high crop yield. In future, we are planning to use some post-emergence herbicides along with this combination.

Studies on germination ecology, phytotoxic effects and control of *Rhynchosia capitata* (Roth) DC in mungbean.

Hafiz Haider Ali[a], Asif Tanveer[b], Ali Raza[a], M. M. Javaid.

[a] Department of Agronomy, University College of Agriculture, University of Sargodha, Sargodha 40100, Punjab, Pakistan.

[b]Department of Agronomy, University of Agriculture, Faisalabad 38000, Punjab, Pakistan.

Email: haider3993@gmail.com

Mungbean is one of the major pulse crops in the irrigated and dry areas of Pakistan. *Rhynchosia capitata,* an emerging annual summer season weed, poses a major threat to mungbean's successful production in the cultivated areas of Southern Punjab of Pakistan and is increasingly becoming a problematic weed in farming systems.Keeping in view the importance of weed management in field crops, the present study was planned to evaluete dormancy, germination, phytotoxicity, competition and control of *R. capitata* in mungbean. Results indicated that germination of seeds mechanically scratched with a sand paper significantly increased by 100% as compared to other treatments. The scarification of *R. capitata* seeds with H_2SO_4 induced seed germination. Effect of varying levels of environmental factors (e.g., temperature, light, water availability, pH, salt stress and seeding depth) on *R. capitata* germination and emergence was tested. Germination increased as the temperature increased from 25°C and significantly reduced at 45°C. Germination of *R. capitata* seeds was not influenced by light. The increase in salt stress, moisture stress, and seed burial depth significantly reduced the seed germination of *R. capitata*. Seeds of *R. capitata* had the ability to germinate over a wide range of pH (5-10). In the seed burial trial, the maximum seedling emergence of 93% was at 2 cm depth, and seedlings did not emerge from a depth of 12 cm. Another experiment was conducted to study the effects of root, stem, leaf, fruit and whole plant water extracts and soil infested with *R. capitata* on mungbean germination and seedling growth, and to determine water-soluble and total phenolics responsible for the allelopathic activity. Results showed that aqueous extracts of root, shoot, leaf, fruit and whole plant adversely affected germination and seedling growth of mungbean, but higher inhibition was seen with *R. capitata*leaf water extract. A linear decrease in the germination characteristics of mungbean was observed with the decrease in the concentration of leaf extract from 5% to 1%.The soil incorporated residues of *R. capitata* stimulated the growth of root and hypocotyl at low concentrations (1% w/w), while it inhibited their growth at higher concentrations(4% w/w).

A field study was conducted under irrigated conditions for two crop years (2011 & 2012) at a farmer field in District Layyah, Southern Punjab, Pakistan. Full season weed competition produced thehighest weed fresh and dry weight which was statistically different from all other competition periods during both years. Maximum NPK uptake by *R. capitata* was recorded in plots where weeds were allowed to grow throughout the season. The increase in competition period decreased the mungbean grain yield significantly. In 2011, the weed-free plots produced the highest grain yield of 1690 kg ha^{-1} followed byin the plots (1580 kg ha^{-1}), which received competitionfor3 weeks after planting. A similar trend was also observed during 2012.

Another field experiment was conducted to evaluate herbicides for control of *R. capitata* in 2010 and 2011. All weed control treatments significantly reduced the dry weight of *R. capitata*. The lowest dry weight of 16.3 and 12.4 g m^{-2} was recorded in plots sprayed with pendimethalin+prometrynat 875 g a.i. ha^{-1} in 2010 and 2011, respectively. Maximum NPK uptake by *R. capitata* was recorded in the weedy check plots, in which weeds were allowed to grow throughout the cropping season. Although the maximum seed yield was recorded in the weed-free treatment in both years, there was a considerable difference between both years. Among herbicide treatments, maximum grain yield (1196 kg ha^{-1} in 2010 and 1294 $kgha^{-1}$ in 2011) was recorded with pendimethalin+prometrynat 875 g a.i. ha^{-1}.

Germination ecology, competition, and control of *Emex australis* and *E. spinosa* in wheat

Muhammad Mansoor Javaid[a], Asif Tanveer[b], Hafiz Haider Ali[a] and Ali Raza[a]

[a]Department of Agronomy, University College of Agriculture, University of Sargodha, Sargodha 40100, Punjab, Pakistan
[b]Department of Agronomy, University of Agriculture, Faisalabad 38000, Punjab, Pakistan.
Email: mmansoorjavaid@gmail.com

Wheat is widely infested with *Emex australis* and *E. spinose* in Pakistan. The effect of environmental factors such as temperature, light, pH, salt and drought stress and seeding depth on *E. australis* and *E. spinosa* seed germination and emergence was investigated in the laboratory at the Department of Agronomy, University of Agriculture, Faisalabad, Pakistan. Results indicate that *E. spinosa* and *E. australis* seeds can germinate over a wide range of environmental factors exceptin water stress; however, the environmental factors adversely affected seedling vigor. In a field experiment, wheat crop was planted with varying densities (4, 8, 16 and 32 plants m^{-2}) of *E. australis* and *E. spinosa* each as a single weed species and mixed weed population of the two weed species. The ratio between the two weed species was 1:1. Weed-free plots (control) were included for comparisons. The density level up to 4 plants of *E. australis* and *E. spinosa* each as a single or mixture of both did not affect the number of spike bearing tillers (m^{-2}). After this density level, the number of spike bearing tillers, number of grains per spike, and 1000-grain weight significantly reduced. Biological, grain and straw yield (kg ha^{-1}) of wheat were significantly influenced by *E. australis* and*E. spinosa* as single or mixture of both at the 1:1 ratio. Competition was highest atthe density level of 32 plants of *E. spinosa* (m^{-2}) which resulted in lowest grain yield. Maximum grain yield (>6580 kg ha^{-1}) was recorded in weed-free plots. The maximum grain yield loss (50%) was recorded at the density level of 32 plants of *E. spinosa* (m^{-2}) whereas, the minimum grain yield losses (12%) was recorded at the density level of 4 plants of *E. australis* (m^{-2}). *E. spinosa* has more competitive ability than that of *E. australis* and resulted in more reduction in grain yield than *E. australis*.

A two-year field study was conducted to evaluate *E.australis* control in winter wheat with the addition of adjuvants to post-emergence herbicides . The addition of adjuvants to carfentrazone-ethyl resulted in>94% weed control efficiency against *E. australis*. The adjuvants increase the phytotoxicity of all herbicides against *E. australis* ex ceptthifensulfuron-methyl; however, the maximum increase in phytotoxicity with the addition of both adjuvants was achieved in tribenuron-methyl when compared with herbicides alone. Bromoxynil+MCPA with alkylether sulphate sodium salt recorded maximum wheat yield and yield components. Carfentrazone-ethyl with both adjuvants caused wheat injury and resulted in significantly less wheat yield compared with bromoxynil+MCPAwith alkyl ether sulphate sodium salt.

Managing weeds in maize by adopting various allelopathic strategies, mulching and intercropping

Muhammad Kamran, Ali Raza, Muhammad Ehsan Safdar and Hafiz Haider Ali
Department of Agronomy, University College of Agriculture,
University of Sargodha,
Sargodha 40100, Punjab, Pakistan.
Email: hafizkamran1576@gmail.com

Maize is one of the major crops in the world including Pakistan, India, and Australia. In Pakistan, it contributes about 0.4% of national GDP, which is lower compared with many maize growing countries. This lower level of maize production can be attributed to high weed infestation, poor fertilizer management practices, and water scarcity. Of these factors, weeds are considered to be the major yield limiting factor, causing massive yield losses of 14–25% in maize production annually.

Recently, in these maize-cultivating areas, crop and weeds interference has been described as a significant biological restriction in decreasing the crop yield. Farmers have been reluctant to spend money on appropriate weed control measures in maize. Only a few herbicides are registered against these weeds, but there is a risk of evolution of resistance in weeds, and there are concerns about the high cost of new chemicals, availability of new herbicide products, and the environment. These concerns, which are related to reliance on herbicides, have led to increased interest in the use of allelopathic strategies and cultural practices in integrated weed management programs. However, the use of these practices in maize has been limited by inadequate knowledge of basic weed biology.

Focusing the highlighted problems in the control of weeds, the University of Sargodha weed team initiated different research trials for the effective and timely management of various weed species in maize through allelopathic strategies. In the laboratory trials, the combined effect of allelopathic water extracts of six plant residues (sorghum, brassica, sunflower, maize, rice and mulberry) on germination and growth of horse purslane *(Trianthema portulacastrum)* was evaluated. Three sets of field experiments were conducted. In the first field experiment, allelopathic plant water extracts of sorghum, brassica, sunflower, maize, rice and mulberry were tank mixed with a low rate of atrazine i.e., 1/3rd of the label rate. In

the second experiment, allelopathic crop residues of sorghum, sunflower, rice, and maize were surface mulched. The third experiment included intercropping systems of dwarf sorghum, dwarf sunflower, and mungbean in one or two rows in maize.

Results suggest that herbicide dosage can be reduced by 67% when applied in tank mixture with sorghum + sunflower + brassica extracts each at 18 L ha^{-1}. The mulching of rice +sunflower+maize helped to suppress weeds successfully and resulted in better maize harvests over all other treatments, but it was uneconomical due to high costs involved. Similarly, double row inter cropping of all the above crops in maize was more effective as compare d with asingle row and gave weed suppression that was comparable with hand weeding. Maize growth was suppressed by the inter cropping of allelopathic crops. Different inter cropping systems suppressed maize grain yield by 6 to 38% due to the interference of all elopathic crops. Hand hoeing resulted in 67% higher maize grain yield as compared with the weedy check treatment (maize alone).

The combination of different plant water extracts was more effective than their sole application especially in controlling horse purslane (*Trianthema portulacastrum*). Foliar application of sorghum+sunflower+brassica extracts each at 18 L ha^{-1}combined with a1/3rd dose of atrazine (0.167 kg a.i. ha^{-1}) was the most effective and economical treatment with highest net benefits and marginal returns. Surface mulching and intercropping in maize suppressed weed density and dry weight that were comparable with the label dose of the herbicide but both of these were uneconomical due to high costs involved and concomitantly lower net returns associated with each of these.

In future, researchers need to investigate the impact of intercropping and surface mulching of allelopathic crop residues on soil microbial and physicochemical traits and soil fertility.

India

“Weed Wiper” for managing red rice in rice fields

Dr. A. N. Rao, Consultant, ICRISAT Development Center (IDC) & International Rice Research Institute (IRRI), ICRISAT, Patancheru, Hyderabad - 502324, India.
email: anraojaya1@gmail.com

Weedy rice is currently a major problem in rice across the globe. The labor and water shortages are the major drivers in making farmers shift from transplanting to direct-seeding method of rice establishment. The shift in the crop establishment method from transplanting to direct sowing of rice, dependence on herbicides, reduced tillage practices, acute shortage and high cost of labour are leading to shift in weed flora and making weedy rice a major problem. In Asian –Pacific region, the weedy rice is a major weed in direct-seeded rice. The Weedy rice infestation in rice fields was reported to cause reduction in yield of up to 50-70 per cent and often causes many farmers to abandon the rice farming and leave the field fallow, if the infestation is severe. Hand weeding or herbicidal management are in effective in managing weedy rice due to morphological and physiological similarities amongst weedy rice and cultivated rice.

Dr.Nimmy Jose, an agricultural scientist at Rice Research Station, Kerala Agricultural University, Monkombu, Kerala, India developed a simple devise called, 'weed wiper', in an effort to manage weedy rice ('varinellu' as it is called in Kerala) in rice fields of Kerala. The device makes use of the principal of selective drying of weedy rice panicles by direct contact application of a recommended herbicide, using the weed wiper by taking advantage of the earliness in flowering and tallness of weedy rice compared to cultivated rice. It has been tested successfully in Kuttanad and other areas of Kerala, India. Several farmers have already started using the machine. Dr.Nimmy Jose filed an application for getting Indian patent for the device and transferred the technology to Raidco Kerala Limited, a Government of Kerala enterprise. Further information on “weed wiper” may be obtained from Dr.Nimmy Jose (email: nimmy.jose@kau.in). Dr.Nimmy Jose has received, for her innovative work, the “Mr. Adusumilli Rama Rao Best Thesis Award”, during the Biennial Conference of Indian Society of Weed Science (ISWS) held at Udaipur, India in March, 2017.

Photo: The “weed wiper” developed by Dr.Nimmy Jose

APWSS and IWSS Student Travel Grant Awards Announced

(Dr.A.N. Rao, Secretary General APWSS and Consultant, ICRISAT Development Center (IDC) & International Rice Research Institute (IRRI), ICRISAT, Patancheru, Hyderabad - 502324, India.
email: anraojaya1@gmail.com).

The APWSS Conference provides a unique opportunity for young researchers, especially students to present their research and discuss with leaders in their fields and receive encouragement to continue their work. The 26th APWSS Conference Student Travel Grants Awards are funded by The 26th APWSS Conference Organizing Committee, the Weed Science Society of Japan, and the International Weed Science Society. 2017 Kyoto Student Travel Grants

Travel Grant Recipients:

Travel grants provide partial travel support to students who have an accepted abstract with a high score for the 26th APWSS Conference. They were selected through a competitive application and review process under the 26th APWSS Award Committee's able and impartial Chairmanship of Dr. Tohru Tominaga. All recipients must attend the conference and give a presentation to receive the travelgrant awards. Congratulations to the following awardee students:

I. APWSS Student Travel Grant Recipients (Amount Awarded: 30,000 JPY)

- Mr. Kassio F. Mendes, University of So Paulo, Brazil
- Mr. Rouzbeh Zangoueinejad, University of Mohaghegh Ardabili, Iran
- Mr. Vinay K. Sindhu, CCS Haryana Agricultural University, India
- Ms. Writuparna Dutta, Presidency University, India
- Mr. Shahid Farooq, Gaziosmanpasa University, Turkey

II. IWSS Student Travel Grant Recipients (Amount Awarded: 500 USD)

- Ms. Norazua binti Zakaria, Universiti Putra Malaysia, Malaysia
- Mr. Faisal Islam, Zhejiang University, China
- Ms. Amarpreet Kaur, Panjab University, India

In addition to these, at 26th APWSS Conference, awards will be given to 2 Best Oral Presentations and 2 Best Poster Presentation (Amount awarded: 20,000JPY) for the scientists researchers who are under 35 years old. All the best to young weed scientists.

Upcoming Events

26th Asian-Pacific Weed Science Society (APWSS) Conference 2017

Location: Kyoto, Japan.
Dates: September 19-22, 2017
http://www.c-linkage.co.jp/apwss2017/

Weed Science Society of America (WSSA) Meeting 2018
Location: Arlington, VA
Dates: January 29 – February 1, 2018
http://wssa.net/meeting/2018-meeting/

21 Australasian Weeds Conference (AWC) 2018
Location: Sydney, Australia
http://www.21awc.org.au/

Acknowledgement: APWSS thank Mr. YSN Murthy for his help in the DTP work of this Newsletter