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Dr Asad Shabbir (Editor in chief)
University of the Punjab
Lahore, Pakistan

Dr NT Yaduraju
President, Asian Pacific Weed Science Society

From the editor

Dear APWSS colleagues,

We start this newsletter with a message from our President, Dr NT Yaduraju and news on the launch of Asian Pacific Weed Science online database of Weed Scientists. This is followed by an update on 25th APWSS conference and invitation to IWSC2016. Further, there are some country reports and interesting articles on weeds and invasive plants.

Many thanks to all contributors.

Enjoy the read!

Asad Shabbir

Message from the APWSS President, Dr N T Yaduraju

Dear APWSS membership,

Welcome to Hyderabad !!

The preparations for the upcoming 25th APWSS Conference is on full swing. The response for participation is overwhelming. Over 850 abstracts have been received with nearly 280 of them meant for oral presentation. We hope that these submissions will turn in to actual registrations as well. Our interest in giving the scientists an opportunity to



make oral presentation notwithstanding, due to constraint of time; many papers will have to be pushed to poster presentation. I hope the participants will bear with us. All the plenary speakers listed in the second circular have confirmed their participation. So also the lead speakers. As notified earlier, we would be running five satellite symposia during the Conference. They are on: a) **Parthenium**, b) **Herbicide Resistance**, c) **Weed Utilization**, d) **Biological Weed Control**, e) **Weed Management in CA** and f) **Weedy Rice**. World renowned experts in the field have volunteered to coordinate and moderate these symposia. It would be something unique never attempted in previous Conferences.

The special publication to mark the Golden Jubilee of APWSS – **Weed Science in the Asian- Pacific region** has shaped up very well with contributions from 19 countries. This publication, which is unique, is expected to enhance the image of APWSS manifold. . The Chief Editor Dr V S Rao has seen to it that the publication retains high standards.

Overall, we are trying our best to host a memorable event. Come to Hyderabad and enjoy the Conference!

N T Yaduraju
President, APWSS

APWSS launches online Directory (database) for Weed Scientists

Dear Weed Scientists!

The Asian Pacific Weed Science Society has recently launched an online Directory (database) of Weed Scientists working in the Asia Pacific region. The purpose of this initiative is to bring the regional scientists closer to each other for possible collaboration in research and development.

The weed scientists of Asia Pacific region are hereby urged to please visit the website (www.apwss.org) and register by clicking on APWSS Directory tab or use the

following link

(<http://www.apwss.org/register/user/register>).

If you have any issues, please contact Dr. Asad Shabbir, Admin (Directory)/Web Editor via admin@apwss.org.

Students encouraged attending 25th APWSS conference

Dr. A. N. Rao, Visiting Scientist, IDC and IRRI, ICRISAT, Hyderabad, India

The Indian Society of Weed Science (ISWS) is encouraging the students of different universities in India by establishing a grant for giving away financial assistance to enable students to attend conferences on weed management including Biennial conferences of ISWS. As 25th APWSS Conference is to be held in India, the ISWS decided to encourage students to attend the conference by giving financial assistance to meritorious students. A committee was formed to select students. Of several applications received, the committee has selected 5 Ph.D. scholars for the “Student Travel Grant”. The grant covers the travel expenses, accommodation charges and the conference registration fee. Dr. N.T. Yaduraju, President, ISWS and Dr. A.R. Sharma, Secretary, ISWS have announced that five students were selected for the grant to assist them attending of the 25th APWSS conference They are: Ms. N. Vijji, Tamilnadu Agriculture University, Madurai; Mr. Veeresh Hatti, University of Agricultural Sciences, GKVK, Bangalore; Mr. B.S. Goel, Junagadh Agricultural University, Junagadh, Gujarat state; Ms. Aditi Pathak, R.D. University, Jabalpur, Madhya Pradesh and Mr. Sandeep Rawal, CCS Haryana Agriculture University, Hissar, Haryana. Congratulations to all the five students and wish they will continue to be meritorious in future too and make fruits of weed science research reach farming community.

Invitation to attend IWSC2016 congress

Dear colleagues, ladies and gentlemen,

As you may already know, the 7th International Weed Science Congress will be held from June 19 to June 25, 2016 in Prague, Czech Republic. This traditional

congress of the International Weed Science Society is a unique meeting point for all generations of weed scientists, botanists, plant physiologists, geneticists, ecologists, agronomists, engineers, decision makers, and various stakeholders from all over the World who interact with or conduct activities related to weed science.

This e-mail is my personal invitation to join the community of experienced high caliber scientists in interaction with talented, enthusiastic young generation, and contribute to the overall success of the event. I am convinced that the exciting scientific program, pre-conference courses, many thematic excursions, and *genius loci* of the city of Prague will compel you to take further notice.

I would like to remind you, that the **submission of abstracts closes on October 15, 2015**. Please visit the congress website at <http://www.iwsc2016.org> and if you are interested, please, do not hesitate to submit your abstract!

It is our pleasure to assist you individually. For specific questions, please contact the Congress secretariat (iwsc2016@guarant.cz) or directly contact someone from our organizational team found at <http://www.iwsc2016.org/committees/>.

I would be grateful if you would forward this to your colleagues and friends to whom this would appeal.

On behalf of the organizers
Prof. Josef Soukup
Chair of the Local Organizing Committee

New Zealand Plant Protection Society Activities (2014 – 2015)

Currently the New Zealand Plant Protection Society (NZPPS) has 336 members. This total includes 268 Ordinary members, 37 Associate members, 21 Sustaining members and 10 Life members.

Annual conference: The annual NZPPS conference was organized in August 2014 and 2015 and the papers were published in the peer-reviewed journal, New Zealand Plant Protection.

Symposia: In both years a one-day symposium was organized in association with the annual conference.

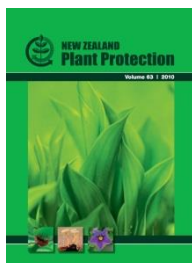
The 2014 symposium was entitled 'The plant protection data toolbox'. The 2015 symposium was on 'Managing wild conifers in New Zealand'.

Professional development: During the annual conference opportunities for professional development were also provided for the participants on Scientific Writing, Study Design and Introduction to R.

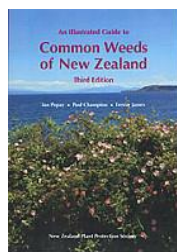
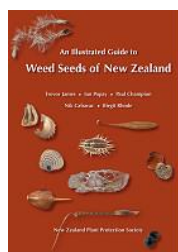
Awards and recognitions: In both years the Society awarded the NZPPS Research Scholarship, Dan Watkins scholarship in weed science, Conference travel grants for students, Travel award for members and the New Zealand Plant Protection Medal.

PUBLICATIONS:

Journal: Two further issues of the journal *New Zealand Plant Protection* were published is a peer-reviewed scientific journal publishing original research papers on all aspects of biology, ecology and control of weeds, vertebrate and invertebrate pests, and pathogens and beneficial micro-organisms in agriculture, horticulture, forestry and natural ecosystems. All back issues are available for free download at <http://nzpps.org/journal.php>.



Books: Two further books were published by the Society, viz. "An Illustrated Guide to Weed Seeds of New Zealand" (2012) and "An Illustrated Guide to Common Grasses, Sedges and Rushes of New Zealand" (2012).. See <http://nzpps.org/books.php>.



Newsletter: The Society produces a biannual newsletter with relevant news and information for its members.

Pesticide resistance strategies: The Society produces and updates information on pesticide resistance issues within New Zealand and strategies for managing pesticide resistance. See <http://resistance.nzpps.org>.

Current office bearers

President: Ms Lisa Jamieson, Plant & Food Research, Auckland

Vice-president: Mr Tim Herman, Pipfruit New Zealand, Hastings
Immediate past president: Mr George Follas, Etec Crop Solutions, Auckland
Secretary: Mrs Jenny Taylor, NZ Plant Protection Society, Auckland
Treasurer: Dr Toni Withers, Scion, Rotorua
Editor: Dr Sue Zydenbos, AgResearch Limited, Christchurch
Website editor: Dr John Kean, AgResearch Ltd, Katikati
Committee members: Mr Graham Burnip, Ministry for Primary Industries, Christchurch; Dr Trevor James, AgResearch, Hamilton; Dr Eirian Jones, Lincoln University, Lincoln; Mr Jason Smith, Horteye Ltd, Nelson; Dr Kirstin Wurms, Plant & Food Research, Hamilton; Dr Rory Roten, Lincoln Agritech, Lincoln.

Contact address: NZ Plant Protection Society, PO Box 21839, Henderson, Auckland 0650, New Zealand
Email: secretary@nzpps.org
Website: <http://nzpps.org>

Desirable tree species gone wild in New Zealand

Drs Anis Rahman and Trevor James

Biological invasions by useful tree species have become a serious threat to ecosystem, biodiversity as well as agriculture in many countries around the world. In New Zealand the most prevalent introduced tree of plantation forestry, *Pinus* Spp. has escaped into non-forestry areas and created a serious management problem for many sectors. The New Zealand Plant Protection Society is therefore organising a one-day symposium on managing wilding conifers in New Zealand. This Symposium precedes the 68th Annual Conference of the Society to be held in Christchurch 11 – 13 August 2015.

The Symposium starts with an invited talk by Dr Martin Nunez of Argentina who will discuss the ecological and evolutionary theories to the management of non-native conifers. This will be followed by scientific presentations on detection, mapping, monitoring and management of wilding conifers (such as wilding pine, Douglas fir). The day will end with the attendees discussing in working groups the current issues in dealing with this problem.



Resistance management workshop

Drs Anis Rahman and Trevor James

The development and use of resistance management strategies is vital in avoiding or delaying the development of pesticide resistance. New strategies need to be developed in a timely manner and existing strategies need to be reviewed regularly to keep information current.

The New Zealand Committee on Pesticide Resistance (NZCPR), a subcommittee of the New Zealand Plant Protection Society is the main advocacy group dealing with pesticide resistance in New Zealand. It was established in 1987 and covers the three main groups of herbicides, fungicides and insecticides.

In May 2015 the New Zealand Plant Protection Society organised a one-day Crop Protection Resistance Management workshop in conjunction with the agricultural chemicals industry organisation, AGCARM. The objective was to review the status of current pesticide management strategies in New Zealand, to identify the need for updates as well as new resistance threats. In addition to people involved in the pesticide industry and various research organisations, the workshop was attended by representatives from different agricultural sectors to assist in improving the effectiveness of resistance strategy development.

The Pesticide registration authority in New Zealand has recently stated that labels on agricultural chemicals must contain the mode of action group (MOA) and resistance management statements (if applicable) to manage the development of insect, pathogen and weed resistance. The mode of action tables have also

been recently updated by NZCPR. The latest status of pesticide resistance in New Zealand and strategies for management of resistance to various herbicides, fungicides and insecticides can be obtained through the website of the New Zealand Plant Protection Society <http://resistance.nzpps.org/>

Activities of Korean Society of Weed Science (2014 ~ 2015)

Annual conferences

Korean Society of Weed Science (KSWS, <http://ksws.kr/>) has a regular scientific conference two times a year, every April (spring) and October (autumn). In 2014, spring conference was held at El Dorado Resort, Shinan, Jeonnam province, on April 24 ~ 25. The total of 92 members participated with 5 plenary talks. Autumn conference was held at the National Institute of Crop Science, RDA, Wanju, Jeonnam province, on October 23 ~ 24. The total of 111 members participated with 4 plenary talks. In both conferences in 2014, 93 speakers gave talks on weed in either oral or poster session.

In 2015, spring conference was held at Daemyung resort, Geoje, Gyeongnam province, on April 23 ~ 24. The total of 110 members participated with 5 plenary talks. 39 speakers gave talks in either oral or poster session. In this conference, 7 members of the Weed Science Society of Jiangsu Province (WSSJP) also participated and 3 of them gave talks in a plenary session.



Autumn conference is scheduled at Hi-One resort, Jeongsun, Kangwon province, on October 22~23.

Journal Publication

Since 1981 KSWS had published Korean Journal of Weed Science 4 issues per year (volume) until 2011.

Then, KSWSS decided to publish journal in collaboration with Korean Society of Turf Science, so publishes Weed & Turf Science 4 issues per year. Weed & Turf Science welcomes papers related with weed science from overseas. Its e-Submission site is as follows, <http://acom.s.kisti.re.kr/journal.do?method=journalintro&journalSeq=J000054&menuId=&introMenuId=0101>

Office bearers of KSWSS

President: Dr. Suk-Jin Koo (Moghu Research Institute, Ltd.: moghu@moghu.com)

Vice presidents: Dr. In-Yong Lee (next president elect, RDA: leeinyong@korea.kr), Dr. Sung-Moon Kim, Dr. Se-Jong Kim, Dr. Tae-Sun Park, Dr. Kwang-Ho Park, Dr. Young-Kwan Ko, Chang-Kook Chung

General Secretary: Dr. Jeong-Sub Choi (Korea Research Institute of Chemistry Technology: jschoi@kriect.re.kr)

Editor-in-Chief: Dr. Kee-Woong Park (Chungnam National University: parkkw@cnu.ac.kr)

Secretary in scientific affairs: Dr. Ki-Hwan Hwang (Moghu Research Institute, Ltd.: moghuin@moghu.com)

Secretary in strategic planning & international affairs, & APWSS country representative: Dr. Do-Soon Kim (Seoul National University: dosoontkim@snu.ac.kr)

Summary of the activities of Weed Science Society of Japan during last two years and updated list of office bearers

Activity from 2014 to 2015

Annual Meeting and Symposium

- 1) 53rd Annual Meeting was held from 29-30 March 2014 at Husei University (Tokyo) with 300 participants.
- 2) 29th Annual Symposium was held on 15 September 2014 at Meiji University (Nagoya) and 80 people participated. The Topic was Some Frontier Topics in Weed Science.
- 3) 54th Annual Meeting was held from 18-19 April 2015. at Akita Prefectural University (Akita) and 237 scientists participated.

- 4) 30th Annual Symposium was held on 5th September 2015 at Shinsyu University (Nagano) and 240 people participated. This was Co-organized with Crop Science Society of Japan (Topics: Weedy rice, evolution, research and future in Japan)

Office bearers' list (from April 2014 until March)

President: Prof. Toru TOMINAGA (Kyoto University)
Vice President: Dr. Yasuhiro YOGO (National Institute for Agro-Environmental Sciences)

Vice President: Dr. Yasuo MORISHIMA (Syngenta Japan)

Editor in Chief for Weed Research, Japan: Prof. Masaru OGASAWARA (Utsunomiya University)

Editor in Chief for Weed Biology and Management: Dr. Hiroaki WATANABE (NARO Tohoku Agricultural Research Center)

Head of Award Committee: Dr. Takashi TAKESHITA (Japan Association for Advancement of Phyto-regulators)

Head of International Committee: Prof. Yoshiharu FUJII (Tokyo University of Agriculture and Technology)

Head of Technical Terms Committee: Prof. Toshihito YOSHIOKA (Fukui Prefectural University)

Head of Symposium Committee: Dr. Tomoko NISHIDA (NIAES)

Head of Financial Committee: Dr. Keiko NAKATANI (NARO Agricultural Research Center)

Representative for APWSS: Prof. Yoshiharu FUJII (Tokyo University of Agriculture and Technology)

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Australian Report from the Council of Australian Weed Societies (CAWS)

Michael Widderick (Australian representative and Immediate Past President of CAWS)

The Tasmanian Weed Society in conjunction with CAWS held the very successful 19th Australasian Weeds Conference. The conference was held in

Hobart, Tasmania, Australia on the 1-4 September 2014. The theme for the conference was "Science, Community and Food Security: the Weed Challenge". Over 250 attended the conference and two CAWS medals for leadership were presented to Rod Randall and John Thorp. The 20th Australasian Weeds Conference will be held in Perth, Western Australia, on 11 - 15 September 2016 (<http://www.20awc.org.au/>).

In 2013 CAWS revamped its strategic plan. As part of the strategic plan, annual operational plans were developed for the three subcommittees of Communication, Advocacy and Promotion and Organisational Development (including a financial plan). This is a new approach for CAWS and was designed around keeping activities focussed and achievable.

The Advocacy subcommittee has been very active and have submitted responses to several national strategies including the Draft National Environment and Community Biosecurity RD&E Strategy (2014-2017) and the Senate Inquiry into Environmental Biosecurity. This area of CAWS has certainly ramped up and I feel has increased the presence and relevance of CAWS nationally.

The CAWS website (<http://www.caws.org.au/index.php>) continues to get bigger and better. All previous Australian/Australasian Weed Conference proceedings are now available on the website. In addition, there is a new secure 'executive only' section which enables the executive to have timely access to reference material for meetings.

CAWS continues to encourage attendance at weed-related conferences and events through their travel awards. Each year, awards are given for student and early career submissions and for attendance at the Australasian Weeds Conference. A full list of recipients is available on our website.

Current Executive of CAWS

- President – Anna-Marie Penna
- Vice-president – Rachel Melland
- Secretary – Kerry Harrington
- Treasurer – Alex Douglas
- Western Australia - Sandy Lloyd and Rod Randall
- South Australia - Rachel Melland and Peter Tucker
- Victoria - Andrew Cox and Ingrid Krockenberger

- Tasmania - Nicole Gill and Sue Hinton
- New South Wales - Hillary Cherry and Kim Hignell
- Queensland - John Clarkson and David Thornby
- New Zealand - Trevor James and Kerry Harrington
- Immediate past president – Michael Widderick

Summary of the activities of Weed Science Society of Pakistan in last 2 years

Publication of Pakistan Journal of Weed Science Research: The Pakistan Journal of Weed Science Research is a quarterly journal of the Weed Science Society of Pakistan. Thus, the society published its 8 issues during the period under reference.

Organizing 5th International/12th National Weed Science Conference: Weed Science Society of Pakistan organized 5th International/12th National Weed Science Conference at Shaheed Benazir Bhutto University, Sheringal District Dir Upper Khyber Pakhtunkhwa Province, Pakistan, on June 12-14, 2015. During the 3-day conference, 250 delegates participated from all across the country and one each from Germany and Iraq. Seventy Five oral papers were given by the delegates in the conference.

Current Executive of the Weed Science Society of Pakistan

President: Prof. Dr. Khan Bahadar Marwat, Vice Chancellor, Shaheed Benazir Bhutto University, Sheringal, Dir Upper, Pakistan. Phone +92-944-885-527 E-mail:kbmarwat@sbbu.edu.pk.

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Vice President Khyber Pakhtunkhwa: Prof. Dr. Naqib Ullah Khan, University of Agriculture, Peshawar. Phone +92-91-9216447 E-mail: nukmarwat@yahoo.com.

Vice President Balochistan: Prof. Dr. Rasool Bakhsh Tareen, Department of Botany, University of Balochistan, Quetta. Phone +92-81- 9211432 E-mail: rbtareen@yahoo.com.

Vice President Azad Jammu and Kashmir: Prof. Dr. Mushtaq Hussain Kazmi, University of Poonch, Rawla Kot, Azad Jammu and Kashmir Phone +92-5824-960-010 E-mail: kazmimushtaq@gmail.com.

Vice President Federal: Mrs. Shahida Khalid, Weed Science Program, National Agriculture Research Center, Islamabad. Phone +92-300-9896171 E-mail: shahidakhalid@hotmail.com

General Secretary: Prof. Dr. Gul Hassan, Professor of Botany/Weed Science, Shaheed Benazir Bhutto University, Sheringal, Dir Upper, Pakistan. Phone +92-944-885-424 E-mail: hassanpk_2000pk@yahoo.com.

Summary of the activities of Weed Science Society of Bangladesh in last 2 years

Weed Science Society of Bangladesh (WSSB) is an organization of scientists, teachers, students, corporate and other persons/organizations willing to participate in the development of weed science and allied field research. Since its inception, WSSB is engaged in the betterment of crop science research and Weed Science. Main activities of the society encompasses promoting crop science research and technologies based on weed research through publications, demonstrations, dissemination of technologies through conference, workshop, recognizing commendable works in the field of weed science through different awards etc. As a result, the society is gaining popularity day by day as evident from its membership details and the circulation of its publications, the Bangladesh Journal of Weed Science (ISSN 2078-130X) in different parts of the world. Recently, Weed Science Society of Bangladesh has successfully completed its 5th biennial conference on the issue “**Integrated Weed Management for Sustainable Crop Production**” in 16th May, 2015 at BARC conference hall which was a time demanding approach

and published several research articles related to weed management in Bangladesh Journal of Weed Science, Volume (3&4). There were about 500 participants from home and abroad attended the conference. Apart from this, WSSB acknowledges for excellence in any branch of weed science education, research, scientific services etc. and initiated the WSSB award since 2010 which is granted to outstanding individuals or groups whose distinguished contribution over a period of time to do the advancement of weed science is clearly recognized through leadership excellence and/or excellence in research, education etc. This year three weed scientists (Senior and Junior category) were awarded for their respective research.

We welcome and request each and every one those are working in crop science to become member of the society in the form of individual member / institutional member / corporate member etc., to contribute in the field of weed science for the betterment of the farming community.

SolviNix® LC: A Plant Virus Based Bioherbicide

Raghavan “Charu” Charudattan, Ph.D. and **Ernest Hiebert**, Ph.D., Emeritus Professors, Plant Pathology Department, University of Florida-Institute of Food and Agricultural Sciences and President & CEO and Vice-President, respectively, BioProdex, Inc., Gainesville, FL and **Michael Braverman**, Ph.D., Manager, IR-4 Biopesticide and Organic Support Program, Rutgers University, Princeton, NJ

Recently the U.S. Environmental Protection Agency granted an unconditional FIFRA Section 3 registration for a bioherbicide containing a plant virus as the active ingredient. The registration marked the first time a plant virus was registered as an herbicide active ingredient anywhere in the world.

The bioherbicide, with the trade name *SolviNix*® LC, is labeled for use as a post-emergent foliar herbicide to control *Solanum viarum* (tropical soda apple), a South American plant that has become invasive in pastures and conservation areas in the southeastern United States.

Tropical soda apple is native to South America (Argentina, Brazil, Paraguay, and Uruguay) where it has been reported as a moderately frequent invasive weed of pastures, wastelands, orchards, and

roadsides. It has been reported from 18 countries outside its native range as “present” (in eight countries) or “invasive” (in 10) (<http://www.cabi.org/isc/datasheet/50562>). It has been in India for a long time where it is cultivated as a medicinal plant and improved for desirable traits. It is designated as a Noxious Weed in the United States and a Class 2 Regionally Prohibited Weed across New South Wales (NSW), Australia. It is becoming a major pest in the North Coast region of NSW.

The weed infests mainly pastures and conservation areas but is said to affect crops in some countries. Severe infestations can significantly limit the pasture's carrying capacity and lower the stocking rate while biodiversity can be negatively impacted in conservation areas. The seed is principal the means of its spread, which is dispersed by cattle, wild animals, and birds that feed on the fruit and via contaminated hay, soil, equipment, and human movement.

The active ingredient of *SolviNix*[®] LC is a strain of *Tobacco mild green mosaic virus* (TMGMV). Known for nearly 70 years, TMGMV is a pathogen of tobaccos (*Nicotiana* spp.), peppers (*Capsicum* spp.), and about 20 other species in the Solanaceae. It was first described as a mild strain of *Tobacco mosaic virus* (TMV) and later named variously as *Green tomato atypical mosaic virus*, *Para-tobacco mosaic virus*, *Tobacco mosaic virus*-South Carolina mild mottling strain, *Tomato atypical mosaic green mottling strain*, *Tobacco mosaic virus* strain U2, and *Tobacco mosaic virus* strain U5. It is now classified as a distinct *Tobamovirus* species, *Tobacco mild green mosaic tobamovirus*, with two naturally occurring strains, U2 and U5. An isolate of the U2 strain is used as the active ingredient in *SolviNix*[®] LC.

TMGMV is believed to occur worldwide in tropical and subtropical regions where *Nicotiana glauca* (tree tobacco), a natural host to this virus, is distributed. Normally, TMGMV is found infrequently in *N. glauca* and some cultivars of tobacco (*N. tabacum*) and pepper (*Capsicum* spp.) but is not known to cause serious economic losses. Typically, it causes a mild, green, systemic mosaic symptom in susceptible hosts but in tropical soda apple it elicits a lethal hypersensitive response expressed as systemic necrosis and plant death. Just one application of the virus by high-pressure foliar spray to a few physiologically active leaves on a plant is sufficient to infect and kill the entire plant, including the root system. *SolviNix*[®] LC has performed consistently in field trials yielding > 85% weed kill in about 3-6 weeks following a high-pressure foliar application. So far, no

natural resistance to TMGMV U2 has been found among tropical soda apple plants in the United States. Also, several tropical soda apple accessions from New South Wales, Australia, have been found to be equally susceptible as the Florida plants to the virus.

The discovery that TMGMV-mediated lethal hypersensitive response could be used as a novel method of weed control was made in 1999 in Dr. Charudattan's biological control of weeds program at the University of Florida-Institute of Food and Agricultural Sciences (UF-IFAS). The project was subsequently moved forward and industrially developed by BioProdex, Inc., the *SolviNix*[®] LC registrant (www.bioprodex.com). With funding from USDA-National Institute of Food and Agriculture-Small Business Innovation Research (USDA-NIFA-SBIR) Phase I and II grants, the company developed a scalable industrial process to mass produce the virus and formulate it into a commercial product, and assembled a registration data package.

The long process of registration, which began in 2005, was finally successful thanks to the navigation of the registration effort by the IR-4 Biopesticide and Organic Support Program. Collaboration of UF-IFAS research and extension faculty, staff, and students as well as the support and encouragement from the Florida Cattlemen's Association, the Tropical Soda Apple Taskforce, and the Florida Department of Agriculture and Consumer Services-Division of Plant Industry were also crucial to the registration efforts.

Registration of *SolviNix*[®] LC exemplifies an effective collaboration in research and technology transfer involving a land-grant university (UF-IFAS), governmental support (USDA-NIFA-SBIR and IR-4), and a private enterprise (BioProdex, Inc.).

It can be reasoned that the time it took to register *SolviNix*[®] LC, nearly 10 years from the registrant's pre-registration consultation with the EPA in 2005, is due to the fact that this was the first proposal to register a virus as a bioherbicide agent. With no prior example to draw from, much effort went into data gathering, particularly nontarget plant host range, field efficacy, and label parameter data. In the end, it is the uniqueness of the tropical soda apple-TMGMV U2 system coupled with several well-known features of the virus that assured that the virus can be used safely as a bioherbicide.

First and foremost, TMGMV U2 **KILLS** the tropical soda apple plant quickly, completely, and consistently, which is a rare feature among plant viruses. Typically, plant

response to virus infection is expressed as immunity (no visible plant response), resistance (necrotic local lesions in infected leaves only), or susceptibility (systemic mosaic, foliar mottling, plant stunting, and other debilitating yet nonlethal symptoms). Relatively rarely, as in the TMGMV U2-tropical soda apple system, the resistance response is expressed as lethal, hypersensitive, systemic necrosis.

Since infected tropical soda apple plants are completely killed, no infected but still living plants are left in the field to serve as a virus reservoir. Moreover, as the virus is mechanically transmitted and has no known, confirmed, vector capable of disseminating it, it can be used in targeted applications without the risk of secondary spread.

Despite its worldwide occurrence, TMGMV is genetically stable, as evidenced by the low frequency of emergence of new strains in nature. Furthermore, in

nature TMGMV has a restricted host range compared to the moderately broad host range reported from artificial manual inoculations in the laboratory/greenhouse.

Unlike fungal foliar bioherbicides that require optimum moisture and humidity for performance, the virus infectivity and disease development are not constrained by microclimatic conditions. Consequently, field application of SolviNix[®] LC is generally unencumbered by the weather. Finally, from the literature it seemed possible to mass produce the virus on an industrial scale to meet the market needs. BioProdex, Inc. has now confirmed this through its production process. The manufactured virus end-product, when stored properly, is stable for many years, which makes the industrial production cost-effective and expedient. So, in retrospect, TMGMV U2 is an ideal viral agent for development as a bioherbicide.



Left: Thorny leaves of tropical soda apple plant. Right: Flowers.



Tropical soda apple fruit. Left: Partially mature, green fruit (this picture is from Bugwood, U. Ga. collection). Right: Fully mature, yellow fruit.



Tropical soda apple infestation in a pasture (left) and a conservation area (right)



Reaction of TSA to *SolviNix*® LC treatment. Left to right: An untreated TSA plant and a *SolviNix*® LC treated plant on days 13, 23, and 33 after treatment.

25th APWSS Conference organizing committee meeting held at Hyderabad

(News item by Dr. A.N. Rao, IDC and IRRI, ICRISAT, Hyderabad, India; email:anraojaya1@gmail.com)

A meeting of the organizing committee of 25th Asian Pacific Weed Science Society (APWSS) Conference was held at Hyderabad on 22 August 2015 under the chairmanship of Dr. N.T. Yaduraju, President, APWSS. Dr. A. R. Sharma, Secretary, ISWS and 25th APWSS Conference has briefed the members about the progress so far made in the organizing the conference. Several aspects of the smooth organization of the conference were discussed. Dr. A.N. Rao, Chairman, Technical Program committee, 25 APWSS conference

has updated the members on the program chalked out for the conference. A few suggestions were given by the members and they are being incorporated and the technical program is being finalized. The committee members have gone around and visited the facilities at the venue - Professor Jayashankar Telangana State Agricultural University (PJTSAU), identified the halls for smooth conduct of the oral and poster presentations. Six symposia will be held concurrently in the afternoon of 14 October 2015 at 25th APWSS conference.

Symposia cover aspects of: Weed Management in Conservation Agriculture (Convener: Prof Deirdre Lemerle); Weedy rice (Conveners: Drs. Roberto Busi, Stephen Powles and Bhagirath Chauhan); Herbicide Resistance: Current Status and Future Challenges Globally (Conveners: Drs. Prashant Jha and Ian Heap); Biological control of weeds (Conveners: Drs. Dhileepan and R. Charudattan); Parthenium (Convener: Dr. Steve Adkins) and Weeds utilization (Convener: Dr. Nimal Chandrasena). The detailed programs of the symposia are uploaded on to the web cite: <http://isws.org.in/apwss25th.aspx>, where other details of the 25th APWSS are available.

More research needed on glyphosate in Asian Pacific Region

(News item by Dr. A.N. Rao)

The herbicide glyphosate was introduced in 1974 and it has become the most widely used herbicide for urban, industrial, forest and farm use. Pre-harvest application of glyphosate to wheat and barley as a desiccant was suggested as early as 1980, and it is currently used as a drying or ripening agent 7-10 days before harvest. Worldwide, it is now used on grain crops, rice, seeds, dried beans and peas, sugar cane and sweet potatoes.

Its use was accelerated with the advent of herbicide-tolerant genetically engineered (GE) crops.

Evidence is mounting that glyphosate interferes with many metabolic processes in plants and animals and glyphosate residues have been detected in both. Glyphosate was reported to disrupt the endocrine system and the balance of gut bacteria, it damages DNA and is a driver of mutations that lead to cancer [Swanson, N.L., Leu, A., Abrahamson, J and Wallet, B. 2014. Genetically engineered crops, glyphosate and the deterioration of health in the United States of America. *Journal of Organic Systems*. 9(2): 6-37]. The World Health Organisation also published a study showing the glyphosate is a probable human carcinogen, with animal testing linking its exposure to cancer. Several countries have made moves to ban its use, most recently France and The Netherlands. However in Asian Pacific region countries, it is widely used. More research efforts are needed on the claimed adverse effects of glyphosate and the extent of harm it is causing in the Asian Pacific Region, if at all the glyphosate is as harmful as it was reported to be.

***Cirsium arvense* – a major threat to Changthang pastoralism of Leh-Ladakh**

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Creeping thistle (*Cirsium arvense*), also referred to as Canada thistle is becoming a major threat to Changthang pastoralism of Leh-Ladakh and creating imbalance in the natural eco-system of the region. Changthang, being a home to Changpa nomads for centuries. Preserving pastureland is the only means to survive the harsh weather. Survival of flocks of sheep, yak, goats and horses corresponds to the decline balance in nature. In Changthang pastoral ecosystems, being natural vegetation for nomadic livestock economy is under threat with vegetation other than on which livestock survive. Immediate attention is needed to control the menace of *C. arvense* in this region.



Recognitions and Awards

Dr. Samunder Singh, Principal Scientist of Agronomy Department, CCS Haryana Agricultural University and Secretary of International Weed Science Society has been nominated Scientific Expert on herbicides in a newly



constituted Expert Committee for the consideration of bio-efficacy protocols for pesticide registration by the Central Insecticide Board and Registration Committee (CIB&RC) of Directorate of Plant Protection, Quarantine and Storage, Department of Agriculture and Cooperation under Ministry of Agriculture, Government of India.

Dr. Singh, was also awarded **Honorary Member of Weed Science Society of America** in a function held on 9 Feb. 2015 at Lexington, Kentucky, USA. This is the most prestigious award only given to one person every year or sometime every other year from the whole world for meritorious service to the field of weed science. The award also has a cash prize of US\$1000 towards travel cost. Dr. Singh is the first Indian Weed Scientist selected for this honour.



Dr. T. K. Das, Principal Scientist, Division of Agronomy, ICAR-Indian Agricultural Research Institute (IARI) received the Hooker Award 2012-13 in 2015 for his outstanding research contributions in the field of weed management and conservation agriculture. The Award is instituted by the Indian Agricultural Research Institute, New Delhi and was conferred on him on the occasion of 53rd Convocation held on February 20, 2015. The Award carries a cash prize of Rs. 15, 000/- a certificate and citation.

APWSS Young Scientist Award – 2015

Dr. Bhagirath S. Chauhan, a doctorate in Weed Science from University of Adelaide, South Australia (John Alwright Fellow) holds research interests in weed ecology and biology, herbicide use, integrated weed management systems using agronomic and varietal components and



conservation agriculture systems. He has worked as weed scientist in International Rice Research Institute (IRRI) Philippines from 2007-2014. He has published more than 150 articles and book chapters. He is Editor-in-Chief of Crop Protection (Elsevier) and associate editor in many other international journals. He is presently Principal Research Fellow at Queensland Alliance for Agriculture and Food Innovation (QAAFI), The University of Queensland, Toowoomba, Queensland 4350, Australia.

Dr. Puja Ray obtained her doctorate from Rani Durgawati University, Jabalpur, India, and also served as Rhodes Post-Doctoral Fellow, Rhodes University, South Africa. She has made significant contributions in the field of weed and insect-pest management, activity enhancement of biocontrol



agents of weeds,

mycoherbicide production and application, insect-pathogen-weed interaction, and non-target impact of microbial and chemical herbicides. She has published more than 25 articles in peer reviewed journals, and received 7 awards at the national and international level. Presently, she is serving as Assistant Professor (Zoology), Department of Biological sciences, Presidency College, Kolkata, India.

IWSS Award

The International Weed Science Society awarded two travel grants to two young scientists who are presenting papers at the forthcoming 25th APWSS Conference in Hyderabad India. The recipients are:

DR. SANDYA RANI KESOUJ
MS. MEENAKSHI SANGWAN

The IWSS will provide a total of \$1,000 to help support their travel.

Upcoming Conferences on Weed Science and Invasive Species

25th Asian Pacific Weed Science Society Conference

Venue: Hyderabad, India

Website: <http://apwss.org/>

Dates: 13-16 October 2015

7th International Weed Science Congress

Dates 19-25 June 2016

Venue: Prague, CZECH REPUBLIC

Website: www.iwsc2016.org

11th International Symposium on Adjuvants for Agrochemicals (ISAA 2016)

June 20-24, 2016

Website: www.isaa-online.org

20th Australasian Weeds Conference (20AWC)

Venue: Perth, Australia

Website: <http://www.20awc.org.au/>

Dates: September 11-15 2016