



INVASIVES

Newsletter of the Asia-Pacific Forest Invasive Species Network (APFISN)

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- Control of Pests and Weeds by Natural Enemies

Forthcoming Symposia/Workshops

- 4 - 6 March 2008. 24th German Conference on Weed Biology and Weed Control, Stuttgart-Hohenheim, Germany.
- 21- 26 April 2008. Asia-Pacific Forestry Week - Forestry in a Changing World, Hanoi, Vietnam.
- 21-23 April 2008. Workshop on Risk-based Targeted Surveillance for Forest Invasive Species, Hanoi, Vietnam.

The Asia-Pacific Forest Invasive Species Network (APFISN) has been established as a response to the immense costs and dangers posed by invasive species to the sustainable management of forests in the Asia-Pacific region. APFISN is a cooperative alliance of the 33 member countries in the Asia-Pacific Forestry Commission (APFC) - a statutory body of the Food and Agriculture Organization of the United Nations (FAO). The network focuses on inter-country cooperation that helps to detect, prevent, monitor, eradicate and/or control forest invasive species in the Asia-Pacific region. Specific objectives of the network are: 1) raise awareness of invasive species throughout the Asia-Pacific region; 2) define and develop organizational structures; 3) build capacity within member countries and 4) develop and share databases and information.



Ageratum conyzoides - Habit

INVASIVES, bimonthly newsletter of the Asia-Pacific Forest Invasive Species Network (APFISN) is intended to share information among countries in the Asia-Pacific region on Forest Invasive Species (FIS) and the threats they pose in the region. If you have any items of news value on FIS to share between national focal points of APFISN and more widely among foresters, agriculturists, quarantine personnel and policy makers, please pass them on to the editor - Dr. K. V. Sankaran, APFISN Coordinator, Kerala Forest Research Institute, Peechi-680 653, Kerala, India (sankaran@kfri.org). The newsletter is supported by the Food and Agriculture Organization of the United Nations (FAO) and USDA Forest Service.



➤ Threats

Billy-goat weed (*Ageratum conyzoides*)

Ageratum conyzoides, commonly called billy-goat weed, is an annual herb of the family Asteraceae that grows about 30 to 100 cm high and produces small, pretty pink flowers at the top of its hairy stems. The native range of *ageratum* is Central America and the Caribbean. It is a major weed in several countries in the tropical and subtropical regions of the world. The exotic range of the weed includes Australia, Brazil, Cambodia, China, Colombia, Costa Rica, Ecuador, Fiji, French Polynesia, Guam islands, USA (Hawaiian Islands), India, Indonesia, Japan, Malaysia, Mauritius, Nicaragua, Palau, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, Thailand, Tonga, Vanuatu and Vietnam.

Ageratum is an erect annual herb. The young stems are often red and pubescent; leaves are opposite, weakly aromatic or unpleasant smelling, ovate or rhombic-ovate, acute at the apex, acute to obtuse or subcordately rounded at the base, pubescent on both surfaces, glandular dorsally, 2 - 10 cm long and 1 - 6 cm wide. The petiole is pubescent, 1 - 5 cm long; the inflorescence contains 30 to 50 pink flowers arranged as a corymb; the corolla is about 1 mm long, white or blue-purplish, included in the involucre; the fruit is an achene 1.5 - 2 mm long, glabrous between the ribs; pappus has 5 triangular scales. A plant may produce about 40,000 seeds and in some areas 50% of the seeds will germinate shortly after they are shed. Seeds are positively photoblastic and viability is often lost within 12 months. Seeds are spread by wind and water and germination occurs under a wide range of conditions. *Ageratum* exhibits high morphological variation and easily adapts to different ecological conditions.

The plant grows in a variety of soil types such as sandy, loamy and clayey, and tolerates a range of pH levels; however, it thrives best in rich and moist mineral soils. *Ageratum* normally occurs as a weed in frequently disturbed areas such as vegetable gardens, agricultural areas, pastures (especially when overgrazed), plantations, orchards and along roadsides. The plant is shade-tolerant and drier and less fertile conditions do not suit its growth. In Fiji, *ageratum* is occasionally cultivated, but is most often seen as an abundantly naturalized weed at elevations from near sea level to about 950 m.

Ageratum contains many bioactive compounds including flavonoids, alkaloids, coumarins, essential oils, chromenes, benzofurans, terpenoids and tannins. It is widely used in traditional medicine worldwide to treat a variety of conditions. A few examples are: pneumonia, diarrhea,

rheumatism, colds and fevers, ulcers, pains, bleeding, spasms, headache, wounds and burns. The plant has also good insecticidal, nematocidal and bacteriocidal properties. Several pharmaceutical companies use *ageratum* as a raw material for phytochemicals and the demand is increasing year by year. The use of this plant as a natural biocide for pest management requires further investigation.



Ageratum conyzoides - flowers

Physical control of *ageratum* is possible by preventing its germination by using mulches, if they are thick enough and left undisturbed. The plant is susceptible to hand weeding, chipping and cultivation under dry conditions, but parts of the stem may take root if left in contact with moist soil. Unpalatable to livestock, it can be controlled by competition from leafy crops such as cassava and sweet potato.

A variety of chemicals have been used to control *ageratum*, including diuron, atrazine, acifluorfen, ametryne, bromacil 2,4-D, glyphosate, fluroxypyr, diquat and paraquat. It is susceptible to most herbicides suitable for controlling broad-leaved plants. However, there are potential conflicts of interest in the management of the weed, considering its wide range of end uses.

➤ News column

Stocktaking reports of forest invasive species for Cambodia, Bhutan and Vietnam prepared

The APFISN Coordinator visited network focal points in Bhutan, Cambodia and Vietnam in November 2007 to help them prepare national stocktaking reports of forest invasive species in each country. He spent 3-4 days in each country organizing workshops on "forest-invasive species in the Asia-Pacific region" to create awareness of FIS among policy makers, quarantine officials, forest officers and forest

scientists. He also talked about the objectives and goals of the Asia-Pacific Forest Invasive Species Network and requested the cooperation of focal points and scientists to implement various programs of the network. The workshops in each country were very well attended. The participants

included senior officers of the Forest Department, Forest and Wildlife Research Institutes, Plant Protection Departments, Law and Legislation Office, Forest and Industry Trade Development Office, Quarantine Office, etc. Several field forest officials also attended the workshops. Each workshop became a venue for free interactions and a good percentage of the participants used the opportunity, despite language problems. Dr. N.H. Nghia, Director-General, Forest Science Institute of Vietnam, Mr. Chheng Kimsum, Deputy Head of the Forest Administration, Cambodia, and Dr. D.B. Dhital, Joint Director, Department of Forests, Thimpu, Bhutan, appreciated the help of the network in carrying out the stocktaking exercise. They also offered all possible help from their respective countries to make the network more active and functional. A few of the important issues brought out during the workshop sessions were:

- lack of appropriate policies and quarantine regulations in individual countries to deal with FIS;
- lack of expertise to deal with FIS (especially taxonomic expertise) and need of capacity building and training on various aspects, including forest health surveillance techniques;
- need of an illustrated guide of forest invasive species in the Asia-Pacific region; and

Fungus may halt advance of invasive weed

Pyrenophora semeniperda, a soil fungus, may act as a silver bullet against cheatgrass (*Bromus tectorum*), a destructive invasive grass which is widespread in the USA and Canada. The grass, native to Europe and parts of Asia and Africa, has the potential to completely alter the ecosystems it invades. It can crowd out native grasses, shrubs and flowers and provide explosively dry fuel for massive wild fires. It thus has serious impact on grazing and forage production for wildlife. But, the discovery of *P. semeniperda*, which kills the seeds of the weed, can change the entire scenario. Prof. Julie Beckstead and David L. Boose of Gonzaga University (USA) will work with colleagues at Brigham Young University and the US Forest Service's Mountain Research Station in Provo, Utah to gain a better understanding of this fungus and its effect on native plants.

Warning on danger of biofuels

According to a scientist at the Green house 2007 Conference (held in Sydney), hope for biofuels as an alternative fossil fuel are premature, if not misplaced. It is argued that many of the plants being promoted as biofuel plants are actually weeds that could create ecological and environmental problems. The cultivation of seven promising biofuel plants is banned in Australia and two of those, jatropha and spartina, have been featured on an international list of the world's 30 worst invasive plants. These plants can outgrow native vegetation, reduce habitats for native animals and ultimately spark a loss of biodiversity. It was also mentioned that the technology to convert the plants into ethanol was of questionable environmental efficiency and much of the land used for biofuel plants came at the expense of land used for food, which was required by the world's growing population.

New publications

Parker, M.A., Wurtz, A. and Q. Paynter. 2007. Nodule symbiosis of invasive *Mimosa pigra* in Australia and in ancestral habitats: a comparative analysis. *Biological Invasions*, 9: 127-138.

Wilson, J.R.U., Yeates, A.G., Schooler, S.S. and M.H. Julien. 2007. Rapid response to shoot removal by the invasive wetland plant, alligator weed (*Alternanthera philoxeroides*). *Environmental and Experimental Botany*, 60: 20-25.

Neve, P. 2007. Challenges for herbicide resistance evolution and management: 50 years after Harper. *Weed Research* 47, 365-369.

Holst, N., Rasmussen, I. A. and I. Bastiaans. 2007. Field weed population dynamics: a review of model approaches and applications. *Weed Research* 47, 1-14.

Keller, Reuben P., Lodge, David M. and David C. Finnoff. 2007. Risk assessment for invasive species produces net bioeconomic benefits. *Proceedings of the National Academy of Sciences* 104, 203-207.

- urgent need of awareness-raising among policy makers, quarantine officials, foresters and the common man.

The APFISN was urged to circulate its newsletter and fact sheets as widely as possible. A satisfying moment during the workshop was when a senior Cambodian official indicated that following the presentation by the APFISN Coordinator on threats due to invasive species he is fully aware and convinced of the seriousness of the problem. As an action point, he indicated his decision to alert the quarantine people and port officials at borders to thoroughly check the importation of seeds, plants and other products to Cambodia so that any new incursions through these channels could be avoided. The stocktaking reports of FIS for the three countries were completed through the joint effort of the focal points, the APFISN Coordinator and forest scientists in individual countries.

Belz, R.G. 2007. Allelopathy in crop/ weed interactions - an update. *Pest Management Science* 63, 308-326.

Sokefeld, M., Gerhards, R., Oebel, H. and R.D. Therburg. 2007. Image acquisition for weed detection and identification by digital image analysis. In: Stafford, J. (ed): *Proceedings 6th European Conf. on Precision Agriculture, Skiathos, Greece*, pp. 523-528.

Recent Books

Biological Invasions Belowground: Earthworms as Invasive Species. Ed. Paul F. Hendrix, Springer, 2007. The most conspicuous biological invasions in terrestrial ecosystems have been by exotic plants, insects and vertebrates. Less conspicuous, but possibly of equal importance, are invasions by soil invertebrates, which are occurring literally beneath our feet. There is now evidence that exotic earthworm invasions are increasing world-wide and may be having significant impacts on soil processes and plant communities in some regions. The papers in this book are based on efforts by an international group of soil ecologists to assess the biological and ecological mechanisms of earthworm invasions, their geographic extent and impacts on terrestrial ecosystems, and possible means by which earthworm invasions might be mitigated.

Control of Pests and Weeds by Natural Enemies. By Roy Van Driesche, Mark Hoddle and Ted Center, Wiley, 2008. This book offers a multifaceted yet integrated discussion on two major applications of biological control: i) permanent control of invasive insects and plants at the landscape level; and ii) temporary suppression of both native and exotic pests in farms, tree plantations, and greenhouses. Written by leading international experts in the field, the text discusses control of invasive species and the role of natural enemies in pest management. It is an invaluable reference book for biocontrol professionals, restorationists, agriculturalists, and wildlife biologists.

Forthcoming Symposia / Workshops

4 - 6 March 2008. 24th German Conference on Weed Biology and Weed Control, Stuttgart-Hohenheim, Germany. The conference will focus on new developments, modern, forward-oriented research, innovative technologies and solutions in weed management. It is a forum to document and discuss the state of knowledge in weed science and associated disciplines. Contact: weedsience@uni-hohenheim.de

21 - 26 April 2008. Asia-Pacific Forestry Week - Forestry in a Changing World, Hanoi, Vietnam. This is expected to be the largest and most important forestry-related event in the Asia-Pacific region in 2008. It provides a unique opportunity for diverse stake holders and forest managers to share perspectives and seek solutions to the most challenging issues facing forests and forestry today. The topics proposed to be dealt with are: forests in a changing world, forests and poverty, forests and climate change and trade, forest law compliance and governance. The event is expected to bring together over 500 individuals from governments, non-governmental organizations, research institutions, regional and international networks, UN agencies and the private sector. Contact: Mr. Patrick Durst, Senior Forestry Officer, FAO Regional office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand, AP-Forestry-Week@fao.org; Ms. Nguyen Tuong Ven, Deputy Director, FSSPCO, Lieu Giai St., Ba Dinh Dist, Hanoi, Vietnam, van.fssp@hn.vnn.vn

21 - 23 April 2008. Workshop on Risk-based Targeted Surveillance for Forest Invasive Species, Hanoi, Vietnam. This workshop is jointly organized by the Asia-Pacific Forest Invasive Species Network (APFISN), the USDA Forest Service and the Asia-Pacific Association of Forest Research Institutions (APAFRI). The specific objectives of the workshop are: i) to identify various geophysical, biological, ecological and social data and processes to integrate into a risk-based approach to select appropriate pest targets and survey areas to maximize the chance for early detection of forest invasive species; ii) identify specific surveillance techniques utilized in early detection of high risk invasives; iii) use of general awareness and targeted community engagement for early detection programs; and iv) development of appropriate information management techniques for use in surveillance programs. Contact: patrick.durst@fao.org; sankaran@kfri.org