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Invasives

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

Contents

About APFISN

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.

INVASIVES, theNewsletter 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. T. V. Sajeev, APFISN Coordinator, Kerala Forest Research Institute, Peechi-680 653, Kerala , India (tvsajeev@gmail.com). This newsletter is supported by the Food and Agriculture Organization of the United Nations (FAO) and USDA Forest Service.

Bracken fern (*Pteridium aquilinum*)

Pteridium aquilinum, commonly called bracken fern, is native to Africa, Asia, Europe and North America. It is a cosmopolitan weed that is a major threat to biodiversity, livestock and human health. The rhizomes are the main carbohydrate storage organs and their ability to sprout from small sections of the rhizome aids in its fast spread in impacting ecosystems. It is one of the few ferns that can germinate in the dark. The plant produces bitter-tasting sesquiterpenes, tannins and hydrogen cyanide when crushed. The water near a bracken-covered area contains **carcinogens** that are toxic to human and livestock health. The plant is used in folk medicine in a few countries. It is widely distributed in Australia, Bhutan, China, Democratic People's Republic of Korea, Fiji, India, Indonesia, New Zealand, Norfolk Island, Pakistan, Philippines, Republic of Korea, Sri Lanka and Viet Nam in the Asia –Pacific region.

Bracken fern is perennial, gregarious, with well-branched creeping, underground rhizomes. Fronds directly emerge from underground stems which are 200 x 90 cm; the leaf stalk is usually mistaken for the stem, with the leaf divided into numerous segments, each divided or re-divided; the lowest segments are three times compound. Clusters of spore cases densely line the in-rolled edges of the dorsal side of leaves. Sporangium are aggregated into sori on the underside of the frond. A single frond can produce up to 30 million spores and this will be greater in open habitats. Young fronds produce extra-floral nectaries. The dispersal of the rhizome occurs through the movement of soil and spores are dispersed by wind. The spores may be viable for up to ten years. The main mode of reproduction is vegetative.

The plant is abundant at elevations below 3 200 metres. It can tolerate different types of soil, except for heavily waterlogged soils. It can also tolerate a pH between 3 and 8. The young shoots are sensitive to frost and trampling by large mammals. The growth of the plant is favoured by fire and soil acidity. It grows in shaded and un-shaded habitats but grows best in open areas. In North America, the plant occurs in dry to wet forest margins and openings. It is usually common near wastelands, riverbanks, woodlands and cliffs. In central Cameroon, it is found near forest-savannah boundaries in association with *Chromolaena odorata*.

In Western Europe, the shoots of the fern turn copper brown during the dormant season and the fronds gradually break up during late winter.

The plant can replace native vegetation and affect land productivity and biodiversity. It is difficult to control because of the ability to sprout from an extensive network of rhizomes. In the United Kingdom, the plant is a grassland and forestry weed but it expands its range to uplands. It can produce simple phenolic acids that diminish grazing areas and has fungicidal properties. It is also a fire-adapted species and promotes fire by producing a highly flammable layer of dried fronds every autumn.

In New Zealand, the carbohydrate-rich rhizome and below ground parts are considered a delicacy by the Maori people, who also use fire as an aid for hunting, which promotes re-growth of the plant. In early spring, the young leaves and tender leaf stalks are cooked as a vegetable, even though they contain carcinogens. The plant is also used as fuel and for thatching, bedding and compost. After burning, the ashes are used as potash. It is a good indicator of seral forest communities in Oregon (U.S.A.).

Frequent liming and fertilizer application are useful for controlling *Pteridium* in upland regions. Cutting it once or twice a year is also an effective control measure. In Bulgaria, the use of glyphosate has been effective and the herbicide reduces carbohydrate reserves of the rhizome. In Tasmania, metasulfuron methyl and glyphosate are used to manage *Pteridium*. Two defoliating moths, *Panotina angularis* Hampson and *Conservula cinisigna* de Joannis and an unidentified eriophyid mite are host-specific and merit testing as biocontrol agents.

News

Invasion aiding another invasion: Fire ants a good example!

Myrmica rubra

An invasive ant species, *Myrmica rubra*, native to Europe, is now widespread in the eastern part of North America and not only threatens ecosystems but also acts as a carrier of invasive plant seeds to help the invasion. According to researchers from Toronto, this ant species helps to disperse both native and invasive plants but the invasive plants better utilize the seed movement. The study was carried out at University of Toronto Field Station by creating mesocosms – inside 42 small chambers. The researchers filled each chamber with soil and planted four species of spring wildflower - three native species and one invasive species. They then collected European fire ant colonies or a native woodland ant and added the colonies to the chamber. The ants picked the seeds of the four plants but the invasive plant took advantage of being dispersed more than the other species and recruited in very large numbers. As a result of rapid movement of humans around the globe the ecosystem became home to numerous invasive species, says Kirsten Prior, co author of the paper published in the journal *Proceedings of the Royal Society B*. This work exemplifies 'invasion meltdown' that is happening right under our noses.

New publications

Berg,S.H., Goldstein, J.H., Lake, E.C. and V.D. Amico. 2015. Mile-a-minute weed (*Persicaria perfoliata*) and weevil (*Rhinoncomimus latipes*) response to varying moisture and temperature conditions. **Biological Control**, 83: 68–74.

Evan, L. 2015. "Invented Invaders": an engaging activity to teach characteristics & control of invasive species. **The American Biology Teacher**, 77: 73 – 77.

Martinez, J.S.A., Seoane, S.S., Palacin, C., Sanz, J. and J.C. Alonso. 2015. Can Eltonian processes explain species distributions at large scale? A case study with Great Bustard (*Otis tarda*). **Diversity and Distributions**, 21: 123 – 138.

Moran, E.V. and J.M. Alexander. 2014. Evolutionary responses to global change: lessons from invasive species. **Ecology Letters**, 17: 637 – 649.

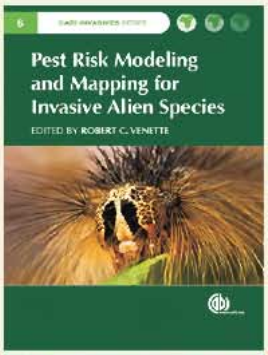
Toledo, D., Sanderson, M., Spaeth, K., Hendrickson, J. and J. Printz. 2014. Extent of Kentucky Bluegrass and its effect on native plant species diversity and ecosystem services in the Northern Great Plains of the United States. **Invasive Plant Science and Management**, 7: 543 – 552.

Verdier, M.B. and P.E. Hulme. 2015. Alien and native plant species play different roles in plant community structure. **Journal of Ecology**, 103: 143 – 152.

Weyl, P.S.R. and J.A. Coetzee. 2014. The invasion status of *Myriophyllum spicatum* L. in southern Africa. **Management of Biological Invasions**, 5: 31 – 37.

Zenni, R.D., Bailey, J.K. and D. Simberloff. 2014. Rapid evolution and range expansion of an invasive plant are driven by provenance–environment interactions. **Ecology Letters**, 17: 727 – 735.

Books



Pest risk modelling and mapping for invasive alien species (CABI Invasives Series): Ed. Rovert C. Venette, CABI, 2015. Over the past century, the number of species that have been transported to areas outside their native range has increased steadily. New pests and pathogens place biological pressure on valuable resident species, but strict bans may conflict with trading and travel needs. An overview of how the conflict can be managed using pest risk mapping and modelling, this book uses worked examples to explain modelling and help develop tool kits for assessment.

***Limnoperna fortunei*: The ecology, distribution and control of a swiftly spreading invasive fouling mussel (Invading Nature - Springer Series in Invasion Ecology). Ed. Demetrio Boltovskoy, Springer, 2015.** This book summarizes all currently available information on the ecology, environmental impacts and control methods of the golden mussel in industrial plants. The golden mussel was introduced in Hong Kong, Taiwan, Japan, and South America between 1965 and 1990, swiftly spreading in freshwater water

bodies. In most areas that it has invaded it has become the dominant macro invertebrate and a major fouling pest of industrial plants. *Limnoperna fortunei* attaches to any hard surface, as well as to some less firm substrates. The growth of *Limnoperna* populations in raw cooling water conduits became a common nuisance in many industrial and power plants that use raw river or lake water for their processes, both in South America and in Asia. This book is written by experts on the golden mussel from Asia, Europe, North America and South America. Each chapter critically reviews previously available information, from sources of limited distribution, such as internal reports and theses, in various languages.

Future events

Sep 20-24, 2015. 13th International Conference on the Ecology and Management of Alien Plant Invasions (EMAPi 2015). Waikoloa Beach Marriott, Big Island, Hawaii. EMAPi 2015 provides the opportunity to share findings and experiences — research, management, and policy — with professionals from around the world. A mid-conference field trip will offer first-hand experience with Hawaii's plant invasions, while also allowing extensive opportunities for networking. This international meeting is expected to bring together around 300 active researchers, managers and policy makers. A special discounted registration will be available to students. Contact: daehler@hawaii.edu

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