INVASIVES

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

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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 32 member countries in the Asia-Pacific Forestry Commission (APFC). The network focuses on inter-country cooperation that helps to detect, prevent, monitor, eradicate and/or control forest invasive e 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.

FROM THE EDITOR'S DESK

INVASIVES, monthly newsletter of the Asia-Pacific Forest Invasive Species Network (AFPISN) 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. It will include information on new threats, available methods of control, ideas on precautionary measures, and news items on workshops, seminars and publications on FIS. 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 it on to Dr. K.V. Sankaran, APFISN Coordinator, Kerala Forest Research Institute, Peechi- 680653, Kerala, India, e-mail- sankaran@kfri.org. Your comments and suggestions for improvement of the newsletter are most welcome!

Editor

THREATS

Fall webworm (*Hyphantria cunea*)

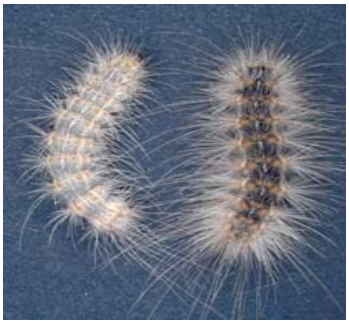
The fall webworm is a native of North America and Mexico. As the name denotes, it is a web-maker. The webworm is a typical polyphagous defoliator. Its larvae feed in colonies on foliage of plants and spin grayish silk webs around leaves and branches in the process. The host plants include shrubs, crops, vegetables, orchard trees, conifers and broad leaved trees but its preference is broad leaved trees. The pest is known to defoliate more than 100 deciduous tree species across the United States and Canada. It was first recorded in China in the 1970's where it is a serious pest of agricultural crops, forests and urban

ornamental trees in six provinces.

Adult fall webworm

There are two races of the webworm, blackheaded and redheaded. Larvae of both are pale, yellowish with a broad, dusky dorsal stripe and yellowish lateral stripes. The larvae are about 25 mm long and covered with grey hair. Moths are white to white with small dark spots. The eggs are usually deposited in a single (blackheaded race) or double (redheaded race) layer of several hundred eggs on the undersurface of leaves. They are green in color and partially covered with short grayish hairs. The attack by the webworm can be identified by the leaf feeding larvae forming large silken webs enclosing one or more leaves and eventually entire branches. On heavily infested trees, several branches may be enclosed in the web and at times small trees may completely be encased in webbing. Large groups of feeding caterpillars can cause sparse and ragged foliage over the entire crown.

The moths can complete 2 (or more depending on location) generations per year. They over-winter as pupae which are dark brown enclosed in thin brown cocoons made of silk with bits of trash. Adults appear in late April. They are strongly attracted to light and can fly about 100 m, during which they also pre-select their host for mating and oviposition. Pupation occurs under roof, rubbles and crevices of tree trunks. High mortality occurs during over-wintering due to low temperature, diseases and predators. Strict quarantine measures are warranted especially targeted at late instar larvae and pupal stage to prevent long distance spread of the webworm through human activities.



Fall webworm-larvae

Mechanical control of the webworm involves removal of the nests by pruning of tree branches or crushing the nests. Biological control is possible through encouraging predators and parasites. Over 80 species of parasites and predators have been identified in North America. These include social wasps, birds, predatory stink bugs, parasitic flies and wasps. Application of the bacterial insecticide (*Bacillus thuringiensis*) is known to be effective against fall webworms if it is applied when the larvae are small. Formulations of the insecticide with UV protectants may be used and the leaves next to nests covered thoroughly. Chemical control is possible through spraying of systemic or non-systemic insecticides.

Silken web formed by fall web worm

Emerald ash borer (*Agrilus planipennis*)

The Emerald ash borer (EAB), *Agrilus planipennis*, is an invasive beetle native to northeastern China, Korea, Mongolia, Japan and eastern Russia. It is a big threat to ash (*Fraxinus* spp.) trees in North America especially in Michigan, Windsor and Ontario areas. Virtually all species of *Fraxinus* (*F. pennsylvanica*, *F. americana*, *F.nigra* and *F. quadrangulata*) growing in the area where the beetle is known to occur are at risk. In Japan, species of *Juglans* (walnuts and bitternuts), *Ulmus* (elms) and *Pterocarya* (wingnuts) have also been recorded as hosts. In China, ash trees are the only known hosts.

Emerald ash borer - adult

Adults of EAB are elongate 7.5-13.5 mm long beetles with striking metallic green coloration. The top of the abdomen under the wings is metallic purplish red and can be seen when the wings are spread. In North America, adult beetles emerge from late May through early August, with emergence peaking in early July. As they emerge, the beetles leave small (3-4 mm in diameter) distinctly 'D' shaped exit holes in the trunk and main branches, which are a sure sign of infestation. Adults feed on foliage for 1-2 weeks prior to mating. They are active during the day, particularly when conditions are warm and sunny. Males are smaller than females and have fine hairs on the ventral side of the thorax, which the females lack. Females produce about 50-100 eggs, which are laid individually on the bark surface, or within bark cracks and crevices. Observations indicate that upper portions of the trunk are colonized initially, making it difficult to detect early infestations.

2 nd, 3 rd and 4th stage larvae

Larvae (26-32 mm long) are white to cream colored and dorsi-ventrally flattened. The 10-segmented abdomen has a pair of brown, pincer-like appendages on the last segment. As larvae hatch, they tunnel into the tree and feed on the phloem and outer sapwood, excavating S-shaped, serpentine galleries just under bark that eventually girdle branches and kill trees. The feeding galleries become progressively wider and longer (20-30 cm) as the larvae grow. They are characteristically packed with fine, saw-dust like frass. Larvae continue to feed through summer and into the fall season with most completing their development prior to over-wintering in the outer bark or just under the inner bark within the outer inch of sapwood. Pupation occurs in mid-to late-spring. Adults emerge soon thereafter to complete the typical one-year life cycle.

Galleries excavated by larvae

It is difficult to detect EAB in newly infested trees. Jagged holes excavated by wood peckers feeding on pre-pupal larvae may be the first sign. When a tree has been infested for at least one year, the D-shaped exit holes left by emerging adults will be present on the branches and trunk. Bark may split vertically above larval feeding galleries. When the bark is removed from infested trees, the distinct, frass-filled larval tunnels that etch the outer sapwood and phloem are readily visible on the trunk and branches. The tunnels excavated by feeding larvae interrupt transport of nutrients and water within the tree during summer. Foliage wilts and the tree canopy becomes increasingly thin and sparse as branches die. Many trees appear to lose about 30-50% of the canopy after 2 years of infestation and trees often die 3-4 yrs of infestation. Epicormic shoots may arise on the trunk of the tree often at the margin of live and dead tissue. EAB can attack trees of various and conditions and age groups.

D-shaped exit holes

The economic and ecological impacts of EAB have been substantial and would be staggering if it continues to spread. Quarantine measures are to be strengthened to prohibit movement of ash trees, logs, branches, firewood and untreated lumber within countries where infestation has been noticed and outside such countries. Insecticides have shown potential for protecting trees from EAB. Best control will be obtained when treatments are initiated just prior to, or in the earlier stages of infestation. Treatments

will have to be repeated each year for maximum efficacy. Systemic insecticides (eg., Imidacloprid) may be applied as soil injections or drenches/tree injections or trunk implants. Protective cover sprays that are applied to the trunk, main branches and foliage using insecticides such as Permethrin, Bifenthrin or Carbaryl may also be effective. However, if EAB infestation has to be eradicated, insecticides are not effective. The only way to eradicate EAB is to cut and destroy infested trees within a one-half mile radius of visibly infected trees. Suitable biocontrol methods are yet to be developed for controlling EAB infestation.

NEW PUBLICATIONS

Little, K.M., Willoughby, I., Wagner, R.G., Adams, P., Frochot, H., Gava, J., Gous, S., Lautenschlager, R.A., Orlander, G., Sankaran, K.V., Wei, R.P. 2006. Towards reduced herbicide use in forest vegetation management. Southern African Forestry Journal, 207: 63-79.

RECENT BOOKS

Molecular biology of weed control: By Jonathan Gressel, Published by Taylor and Francis, 2002. This book assesses the impact of the new tools of molecular biology on the science of weed control as well as the ways in which the science of weed control has helped and influenced molecular biology. It also describes how molecular biology can be used to diminish the use of chemical herbicides, and enhance crop competitiveness for light, nutrients and water.

FORTHCOMING SEMINARS /SYMPOSIA/WORKSHOPS

Meeting the challenge: invasive plants in PNW ecosystems, University of Washington Botanic Gardens, Seattle, WA, 19-20 September 2006. The mission of this conference is to create strategies and partnerships to understand and manage plant invasions in the Pacific Northwest. Contact: jrobins@u.washington.edu; Tel: 206-685-8033.

Fourth European conference on biological invasions NEOBIOTA- from ecology to conservation, Vienna, Austria, 27-29 September 2006. Everyone interested in biological invasions is invited to participate and share thoughts, opinions and new results. Conference topics include: 1) conservation of biodiversity (prevention and monitoring, control and eradication measures, pathways and vectors, policy and legislation, and awareness building), 2) Ecology of invasive alien species (distribution and abundance, patterns and processes, impact and risk assessment and human and animal health impact). Contact: neobiota@umweltbundesamt.at

Erratum

Referring to the article on Giant African snail (GAS) (Newsletter, August 2006), Dr. Mike Cole (National Coordinator, APFISN, Australia) informs that GAS does not occur in Queensland (Australia) now. It was detected a few years ago, but successfully eradicated.The article erroneously stated the occurrence of GAS in Australia. The error is regretted -Editor.

Compiled and edited by Dr. K.V.Sankaran, APFISN Co-ordinator on behalf of the Asia-Pacific Forest Invasive Species Network.For more information on the APFISN, please contact your national focal point or the APFISN Co-ordinator or Mr. Patrick Durst,Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok. Email: patrick.durst@fao.org