Selecting Resistant Species and Varieties for the Control of Pests and Diseases

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Introduction

With few exceptions, plants are naturally resistant to pests and diseases. The objective of this RTN is to inform readers that both pest and disease damage can be effectively controlled by selecting resistant varieties and species. This method of control is both environmentally friendly and cost effective. The information in this RTN is based on observations, research, AVA Pest Alert reports and Pest News and other publications. Having knowledge of species and varieties that are more resistant will help with planning for easy-to-maintain landscapes.

Angsana

In mid 1990s, NParks had successfully screened a number of resistant varieties of Angsana (*Pterocarpus indicus*) against the Fusarium Wilt Disease from seedlings and cuttings collected from numerous locations in Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Singapore and Solomon Islands. All the resistant Angsana obtained were subjected to three screenings in the nursery and one screening in the field with a history of Fusarium Wilt Disease for 16 years. During this period there was no reported deaths of any of the resistant Angsana. We surmise that these Angsana varieties are resistant to the Fusarium Wilt Disease.

In mid 2013, cuttings from some resistant Angsana were taken for propagation. These will be available from Pasir Panjang Nursery in the near future.

Infected angsana at Beach Road and Crawford Street Junction exhibiting characteristic crown symptoms of the Fusarium Wilt Disease (**left**). Resistant Angsana growing at Thomson Road traffic island (**top**) and Toa Payoh Lorong 8 (**bottom**).
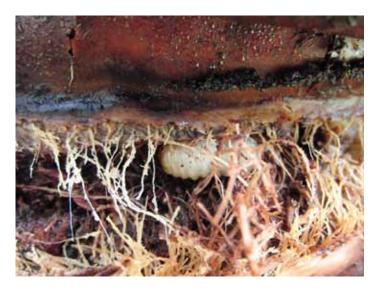
Other examples

Bismarck palm

It has been observed that the green variety of the Bismarck Palm (*Bismarckia nobilis*) is less susceptible to Red Palm Weevils (*Rhynchophorus ferrugineus* & *Rhynchophorus schach*) attack than the silver variety (*Bismarckia nobilis* 'Silver').

Weevil infestations start when adult female weevils lay between 200 to 300 eggs at young leaf bases. They make use of wounds created by other grazers or by leaf pruning. The larvae hatch from eggs and feed before tunnelling into the trunk interior to feed and complete their life cycle. Red Palm Weevils complete their life cycle inside the infested palm, so all life stages (the eggs, larvae, pupae and adults) can be found inside the palm. At late stages of infestation, adult weevils emerge from the palm, leaving numerous exit holes on the trunk. Consequently, the crown of the palm may wilt and topple over.

Young larva feeding inside leaf base after hatching from egg (**left**). Older larva feeding within the trunk tissue of a palm (**right**).

Pupae in cocoons (**left**) & young adult (**right**) of the Red Palm Weevil. Both were found inside the trunk of an infested palm.
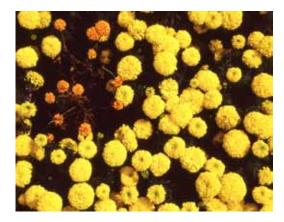
Crown wilting (**top**) and the presence of numerous exit holes on trunk (**bottom left**) characterize the late stages of a weevil infestation. Feeding holes made by larvae inside an infested trunk (**bottom right**).
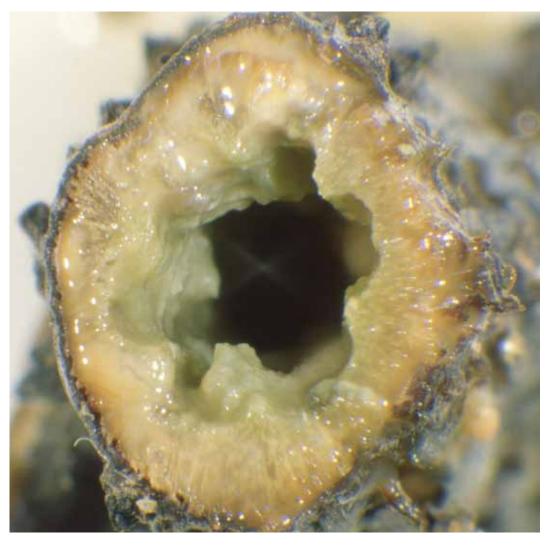

Marigold

Marigolds (*Tagetes erecta*) have varietal differences on susceptibility to a bacterial wilt disease. This phenomenon was observed in the Pasir Panjang Nursery when two varieties of marigold plants growing on a bench were watered with untreated pond water. The yellow variety plants showed no wilting symptom, whereas the golden variety plants wilted and died. When the wilted stems of the golden variety were cut, slimy ooze was observed on the cut surfaces. Analysis of samples from the ooze revealed the presence of significant quantum of bacteria.

The yellow marigold variety is resistant to the bacterial wilt disease, the golden variety is not.

Slimy bacterial oozing out from the cut stem of the wilted golden marigold variety.

Pagoda flower

Another example that demonstrates varietal difference in disease susceptibility is the Pagoda Flower Plant (*Clerodendrum paniculatum*). The variety with cream flowers (*C. paniculatum* 'Alba') is less susceptible to leaf rust fungus than the plant with red flowers (*C. paniculatum*). This phenomenon was observed in the Singapore Botanic Gardens.

The pagoda flower plant with cream flowers (**left**) has no rusty leaf spots. The plant with red flowers (**right**) have many leaf spots.

Malay Apple

Syzygium malaccensis, a medium sized tropical fruit tree with large crimson pink flowers is very susceptible to a gall forming psyllid (*Megatrioza vitiensis*). The galls on the leaves remain for long periods of time after the mature psyllid have emerged, thus making the trees not suitable as shade trees in both parks and roadsides. This pest problem is not only confined to Singapore. It was also reported in Cook Islands, Fiji to Marquesas and other locales where *S. malaccensis* is grown.

Interestingly, other *Syzygium* species have not been observed to be attacked by psyllid leaf galls.

Psyllid galls on the dorsal leaf surfaces of *M. malaccensis* (**left**). The galls on he ventral leaf surface (**right**) split opened to release the mature psyllids.

After hatching from the eggs, nymphs of psyllids stay inside the galls until maturity (**left**). A young mature psyllid (**right**) resting on a gall.

Carol Trees

In 2003, *Erythrina variegata* (Variegated Coral Tree) and *E. fusca* syn. *E. glauca* (Purple Coral Tree) were reported to be infested by a gall wasp (*Quadrastichus erythrinae*). *E. variegata* trees were very susceptible and the trees had knobby galls on the leaves, leaf stalks and young twigs. Severely affected trees had bare crowns, die-back twigs and dead branches. Some affected trees died within a month. However, *E. fusca* appeared to be less susceptible to the gall wasp infestation as the affected trees only had few blister-like galls on the leaves, leaf stalks and young twigs. The gall formation on the coral trees is induced by the presence of wasp larvae feeding in the plant tissues. Some galls are small blister-like, while others are knobby-like depending on the coral tree species.

Coral trees in Malaysia, China, India, Taiwan, Philippines, Hawaii, Mauritius, Reunion Islands and Florida were also reported to be infested by the Erythrina gall wasps.

Numerous blister-like galls developed on the leaf stalks and leaf surfaces of *E. fauca* (**top & left**). When the galls were cut, two wasps were found pupating inside (**right**).

The examples presented in this Research Technical Note, demonstrate that maintenance requirements may be reduced by selecting plant species and varieties that are highly resistant to pests and diseases.

References

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