Stop That Weed!

The weed species in the Malay Peninsula form only 2% of the flora but some are especially noxious and should be eradicated.

By R. Kiew & J.P.C. Tan

Weeds are unwanted plants that require much time and effort to eradicate. Relax, and in no time, they grow vigorously, multiply by seed, and get dispersed. For farms and plantations, weed eradication is a must to prevent commercial loss from reduced production. Many weed species colonise roadsides and have been kept in check by regular mowing.

Perhaps surprisingly, considering how highly visible they are, the 200 weed species form only 2% of the flora of Peninsular Malaysia. The great majority are alien species that grow almost everywhere, especially in disturbed and open areas, rooted in a wide range of soil types, can withstand considerable water stress and even grow in cracks in cement with hardly any soil. In addition, they come without their native pests and predators, so can grow unchecked. Most come from tropical America and to a lesser extent from tropical Africa, while those in Cameron Highlands are from temperate regions. Weeds have a high reproductive capacity and can colonise bare soil rapidly. When they become established in Malaysia, reproduce and spread, they are considered as naturalised and are included as part of the flora. Take Macao tea, *Scoparia dulcis* (Scropulariaceae) from S. America as an example. It is fast growing and seeds early. In 18 weeks one plant can produce about 3000 seeds (Kiew, 1975). With just 5% germination rate, in one year three generations of this species from one individual have the potential to produce more than 70 million seeds, a staggering number. No wonder, it has spread.

Scoparia dulcis

How do weeds spread?

The majority of weeds have sneaked into Malaysia un-noticed and it is only when they have become common and widespread that they receive attention. Grasses like *Pennisetum polystachion*, composites like *Chromolena odorat*a, and the willow herb *Epilobium ciliatum* are dispersed by wind, *Clidemia hirsuta* by birds, *Asystasia gangetica* subsp. *micrantha* by an explosive mechanism that scatters the seeds a few meters, but for weeds with small seeds and no obvious means of dispersal, like *Hemigraphis*

Clidemia hirta

Asystasia gangetica

reptans and *Plectranthus polystachys*, we can only assume the seeds are spread long distances carried on soil on vehicles.

Under natural conditions, wind is the most effective mode of dispersal and this is illustrated by the spread of the tropical American weed, *Chromolaena odorata* (Compositae). In the older literature this species was called *pokok German* (German weed) because it was first noticed during World War I or 'Siam weed' because it first appeared in the north where it had spread from Thailand (Siam). It gradually moved south and by the 1950s was abundant throughout the Peninsula and acquired the name *pokok kapal terbang* (aeroplane weed) (Henderson, 2015). It only reached Singapore in 1983 (Corlett, 1988).

In general, weeds do not penetrate Malaysian forests because of their light-demanding nature. The exception to the rule is *Clidemia hirta*, Melastomataceae that tolerates moderate shade and has seeds that are dispersed by native birds. Now natural habitats that are at risk from invasion by this weed are those with a more open canopy, such as heath forest on the east coast where *Acacia mangium* (Leguminosae) is already invading, and quartzite ridges where the aggressive grass *Pennisetum polystachion*, Gramineae, threatens to outcompete native species (see below).

Asystasia gangetica subsp. *micrantha* (Acanthaceae), locally called *pokok Israel* (Israel weed), was first noticed in the 1970s. Within 15 years, it had become an aggressive weed and by its efficient uptake of fertilizer drastically reduced yield in pineapple and oil palm. Its

natural mode of dispersal is not very effective; its fruits open explosively and throw the four seeds just a meter or so from the mother plant. Its efficient dispersal relies on being carried on soil on vehicles. First seen near Layang-Layang, Johor, where there is an oil palm research station, it has been suggested that this West African weed was introduced accidentally with oil palm seed in the 1970s (Kiew & Vollesan, 1997). It has since spread throughout the Peninsula and had reached Sabah and Sarawak too.

Old and new weeds

Reliable records with information about introduced and naturalised species were only started in the late nineteenth century. Many weeds are garden escapes, like *Ageratum houstonianum*, Compositae (Kiew 2009; Tan *et al.*, 2016) and montbretia, *Crocosmia x crocosmiiflora*, Iridaceae (Kiew 2009) and the multicolored busy lizzie balsam *Impatiens walleriana* (Balsaminaceae) in tea gardens at Cameron Highlands. Others hitched a ride with agricultural or horticultural crops; and a few like the noxious *Cabomba furcata* were introduced by the aquarium trade. Since the 1920s when Ridley completed his 5-volume Flora, there has been a small but steady introduction of weed species (Sinclair (1953), Stone et al. (1977), Turner (1994), Yao (2007), Kiew (2008, 2009) Rafidah et al. (2015), Kiew (2016). Most hail from tropical America and to a lesser extent from tropical Africa but at Cameron Highlands and, to a lesser extent Genting Highlands, temperate weeds can gain a toehold.

Formerly, weeds of vegetable farms at Cameron Highlands were mostly of European origin but recently we are seeing the introduction of weeds from south China. Growers of vegetables and ornamental plants introduce them unintentionally together with their agricultural supplies, including seed, potted plants, growing media, etc. *Ranunculus cantoniensis* (Ranunculaceae), as its name suggests, is of Asian origin. This weed also illustrates another aspect of weed biology, namely that that weeds, when they are first introduced, appear to take some years to become established before they really begin

Impatiens walleriana *Photo: M.H. Khor*

Ranunculus cantoniensis

Cleome rutidosperma

Cuphea carthagenensis

to spread and become a problem. This species was first spotted in Cameron Highlands in 1983; ten years later it was known from one small patch (Turner, 1994) but another ten years on and it has become rampant in many places in the Cameron Highlands and has found its way to Genting Highlands too (Kiew, 2009).

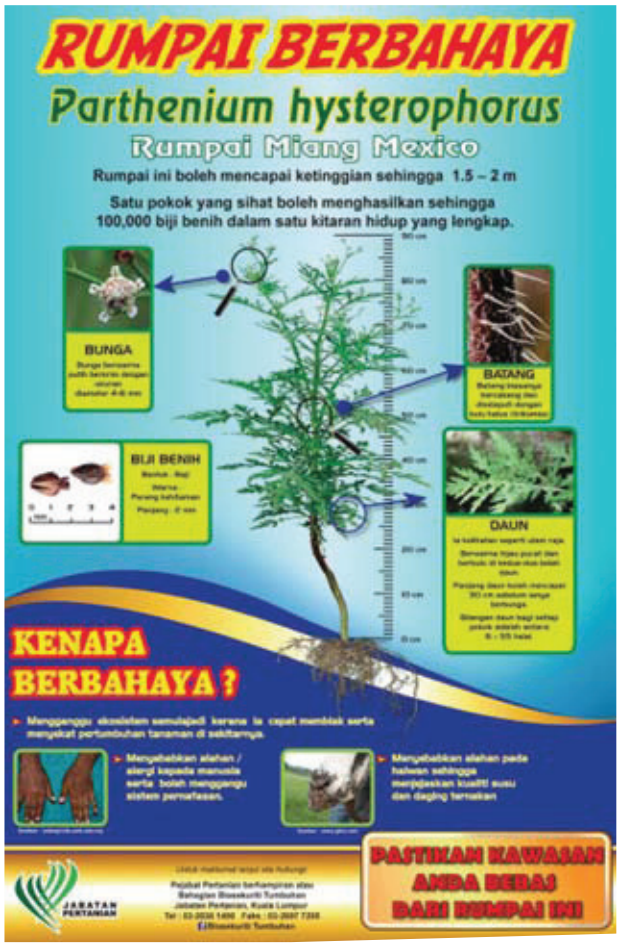
The spread of individual weeds has rarely been tracked. They manage to sneak in and are suddenly noticed when they are already widespread. Then they become a problem and are the focus of attention. Examples of this are found in the updated 2015 Edition of Henderson's *Malaysian Wild Flowers Dicotyledons* that included several weeds that had become widespread since the first edition in 1951, namely purple maman, *Cleome rutidosperma* (Cleomaceae) from tropical Africa; the Colombian waxweed, *Cuphea carthagenensis* (Lythraceae); fragrant milkweed, *Polygala paniculata* (Polygalaceae); lavender sorrel *Oxalis barreliera* (Oxalidaceae) from Brazil and the pretty jade plant, *Hemigraphis primulifolia* (Acanthaceae). The last was first reported in Singapore in 1950 growing outside the Singapore Botanic Gardens, from where it had presumably escaped. It suddenly became common in Malaysia in the 1990s, at first in flower pots and then in everywhere in shaded

Hemigraphis primulifolia

conditions. It does particularly well in areas that are regularly mown because it is a low rosette plant. As yet, it does not appear to be a problem.

Need to monitor recent introductions

Rapid appropriate action was taken by the Ministry of Agriculture when sporadic occurrence of the dangerous weed, *Parthenium hysterophorus* (Compositae), was reported in Peninsular Malaysia, Sabah and Sarawak. There was a widespread publicity campaign about the dangers of handling it and it was classified as a noxious weed because it causes very severe allergic reactions that can even cause death in humans and animals. Under the Plant Quarantine Act 1976 possession will result in a fine of not exceeding RM 1000 or imprisonment not



Parthenium hysterophorus—a warning notice.

exceeding six months or both. From Facebook chatter it appears that it was being grown by some gardeners as a substitute for baby's breath. At present it appears to have been eradicated.

However, several other recent introductions need monitoring because they have become or are very likely to become a problem.

Cabomba furcata (Cabombaceae) This aquatic plant has pretty feathery submerged leaves prized by the aquarium trade and is cultivated commercially under the trade name 'fanwort'. Originally from South America, it was introduced into Tasik Chini where it is

Cabomba furcata

known as *ekor kuching* (cat's tail). It is vigorous and has no natural predators so has reached infestation proportions there, impeding boat travel by clogging up waterways, smothering the iconic lotus for which Tasik Chini is famous, and endangering local species, both plants and fishes (Chew& Siti-Munirah, 2010). It is costly to periodically open the waterways and extremely difficult to eradicate completely because it can regrow from any small fragments left behind. Obviously avoiding introducing fanwort into local ponds, lakes and water bodies is imperative.

Unfortunately its beautiful small pink waterlily-like flowers that are a stunning sight when they flower in profusion tempt people to introduce it into ponds and waterways. First noticed in 1995, by 2010 it was naturalised in Penang, Selangor, Perak, Pahang and Johor. Tasik Chini is a lost cause. Its introduction in Sungai Sedili, Johor, is a great cause for concern and action needs to be taken to eradicate it before it spreads out of control. The great fear is that it will be introduced into Tasik Bera, the largest natural lake in Peninsular Malaysia and a Ramsar site of special scientific and cultural importance.

Pilea nummulariifolia

Pennisetum polystachion

Pilea nummulariifolia (Urticaceae) called 'creeping Charlie' is used as a bedding plant at Fraser's Hill, Pahang. It forms a solid carpet aggressively smothering all the other plants both native and ornamental. Unfortunately, if not checked it spreads into the adjacent vegetation blanketing native plants. It is obviously a species to avoid planting in hill resorts.

Pennisetum polystachion (Gramineae) Yao (2007) and Lim & Yao (2010) reported the heavy infestation by this grass is a serious problem on the Klang Gates Ridge (now called the Gombak Selangor Quartz Ridge) that is proposed as a National Heritage Site within Selangor State Park and is suggested as a World Heritage Site (JPBD, 2015). From tropical Africa, this grass grows to 2 m tall and produces golden spikes with great quantities of plumed fruits that are blown far and wide by wind. Gilliland (1971) in his book of Malayan grasses did not mention it. It was not noticed until about 1996, along roadsides. By 2006 it was naturalised throughout Malaysia, in open spaces and especially along roadsides (Yao, 2007). It is now found in every state from the lowlands to mountain tops in disturbed areas. It poses a fire risk to the entire ecosystem on Klang Gates Ridge in dry periods (Lim & Yao, 2010). To protect this sensitive ecosystem with its unique and endemic species, the weed will have to be eradicated painstakingly by hand-weeding. On the roadsides, it has been eliminated by regular grass-cutting. The implementation of regular grass-cutting on roadsides throughout the country in the past ten years has also eliminated other tall grasses.

Epilobium ciliatum* subsp. *ciliatum (Onagraceae) The fringed willow-herb was first recorded from Cameron Highlands in 2006 when it was confined to the upper slopes of Gunung Batu Brinchang (Kiew (2009) as *E. billadierium subsp. cinereum*). Worldwide is a widespread weed native from N & S America

Epilobium ciliatum

to Japan, Korea and NE China. It is a vigorous perennial that grows to 150 cm tall, but begins to flower at 15 cm tall and produces numerous plumed light seeds dispersed by wind (Ummul-Nazrah, in press). It is one of the most aggressive species in the genus capable of colonising a wide range of habitats, typical of willow-herbs that are notorious for their uncontrollable spread by their wind-dispersed seeds. A single plant of *Epilobium hirsutum*, for instance, can produce 80,000 seeds. Already the fringed willow-herb has spread down the slopes of Gunung Batu Brinchang and is beginning to be established in other places too.

Plectranthus polystachyus (Labiatae). Naturalised only very recently, this weed has spread extremely rapidly and is likely to become an extremely troublesome weed, especially in nurseries. It was first seen in 2003 in Johor, but has since spread to Selangor in 2010 and in Kelantan in 2015 (Kiew, 2016). This widespread dispersal in just over ten years strongly indicates that it threatens to become an aggressive noxious weed in farms, plantations and nurseries. Already it is the most common weed in the nursery at Forest Research Institute Malaysia, Selangor, Malaysia. A native of tropical West Africa, it begins to flower at 10 cm tall, eventually growing to 50 cm tall. It grows vigorously both in full sun in oil palm estates or in light shade in nurseries. At present it is known only from the lowlands. Seeds are dispersed locally when they shake out of the spike or, because they become sticky on wetting, they might be dispersed by animals. For longer distance they are more likely spread in soil on shoes or vehicles or together with planting material. It also has small tubers that readily detach and grow into new plants. In

Plectranthus polystachyus

nurseries using herbicides would probably not be effective because its seeds may germinate in inaccessible nooks and crannies. Dr Francis Ng informed us that he had eliminated this weed from his Secret Garden by diligent and persistent hand-weeding making sure plants were uprooted before they began to flower. Forewarned is to be forearmed. This species should be eradicated before it has a chance to become established and shed its abundance of seeds. So when you buy potted plants, make sure that they are not infested by *Plectranthus polystachyus*.

WANTED! HAVE YOU SEEN THIS WEED?

Although very recently introduced, *Plectranthus polystachyus* has spread with unprecedented speed and quickly forms large populations. To map its extent of occurrence we need your help in letting us know if you have spotted it near

you. If you have, then take a photograph and exterminate it immediately! And then send the photo to us and let us know the location!

Conclusion

Prevention is the best means of control of weeds that are potentially invasive. For this, the first step is correct identification. Once its identify is known, then details of the alien species' biology, life cycle and its potential as an aggressive or rampant weed can be discovered and measures taken to eradicate it and prevent its spread. The success of such a strategy is seen by the extermination of *Parthenium hysterophorus* that has effectively prevented its spread. The consequences of invasive weeds are unpredictable, not only in terms of economic loss either through reduced crop productivity or by costs involved in weed eradication but also in their detrimental interaction with native species and plant communities.

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