Micronesica Suppl. 6: 61–65, 2002

Invasive/Weedy Angiosperms in Kosrae, Federated States of Micronesia

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Abstract—An updated account of alien angiosperm species in Kosrae, Federated States of Micronesia (FSM), based on a recent survey of flora in Kosrae is presented. A few highly potent invasive species in Kosrae are *Merremia peltata* (L.) Merr., *Vigna marina* (Burm f.) Merr., *Panicum maximum* Jacq., *Pennisetum polystachyon* Schult., *Saccharum spontaneum* L., *Commelina diffusa* Burn., *Chromolaena odorata* (L.) King and Robinson, *Clerodendrum* inerme (L.) Gaertn., *Wedelia trilobata* (L.) Hitche and the parasitic weed *Cuscuta filiformis* L.

Introduction

Kosrae is a high volcanic island in the Federated States of Micronesia (FSM) located in the Pacific Ocean at 162.6º E and 5.2º N. It is geologically a very young island, about 1 million years old. Sailors visited Kosrae from the 16th century or earlier. The island was colonized or controlled between 16th century and 20th century by Spain, Germany, Japan and the USA in a succession. Along with culture and trade several species of plants and a few animals were introduced by these foreigners. Additional alien plants, mostly ornamental and a few crop species were introduced by local people from Hawai‘i and the Philippines. In the recent years agricultural, ornamental and forestry species have been continuously introduced from Pacific Rim countries and different island countries in the

Pacific. Alien flora abound in and around the runway of airport of Kosrae indicating a major role played by air traffic in their introductions.

The term invasive species is used to include invasive in natural and agricultural ecosystems. Only angiosperm species are included in this study. Observations on invasive species in Kosrae were made from August 1998 to May 2001. A list of the invasive species in Kosrae is given in the table 1 including the scientific name, family, origin and its status as a weed or invasive plant.

Table 1. Invasive / Weedy angiosperm species in Kosrae, FSM.

Name of species	Status	Family	Origin
Abutilon grandiflorum Willd.	W	Malvaceae	Tropical America
Acacia auriculaeformis A. Cunn.	I	Mimosaceae	Uncertain?
Achyranthes aspera L.	W	Amaranthaceae	Southeast Asia
Adenanthera pavonina L.	I	Caesalpiniaceae	Asia?
Aeschynomene americana L.	I	Fabaceae	Tropical America
Ageratum conyzoides L.	W	Asteraceae	Tropical America
Alternanthera sessilis (L.) R. Br.	W	Amaranthaceae	Southern Asia
Asystasia gangetica (L.) T. Anders	W	Acanthaceae	Africa- Malaysia
Axonopus compressus (Swartz) Beauv.	W	Poaceae	Tropical America
Bidens alba (L.) DC.	I	Asteraceae	Tropical America
Calliandra haematoma Benth.	W	Mimosaceae	Brazil & Bolivia
C*allicarpa candicans* (Burm.f.) Hochr.	W	Mimosae	South Asia- C. Islands
Cassytha filiformis L.	I	Laurinae	Tropical Asia?
Centella asiatica L.	W	Apiaceae	Asia
Chamaesyce hirta (L.)	W	Euphorbiaceae	Tropical America
*Chamaesyce hypericifoli*a (L.)	W	Euphorbiaceae	Tropical America
Chloris barbata Swartz	W	Poaceae	Tropical America
Chromolaena odorata (L.) King & Robinson	I	Asteraceae	Tropical America
Chrysopogon aciculatus (Retz.)	W	Poaceae	Tropical Asia
Cleome spesiosa Rafinesque.	W	Caparidaceae	Tropical America
Clerodendrum inerme (L.) Gaertner	I	Verbenaceae	Southern Asia
Clerodendrum quadriloculare (Blanco) Merr.	W	Verbenaceae	Southern Asia?
Commelina diffusa Burm. f.	I	Commelinaceae	Tropical Asia
Crotalaria pallida Ait.	W	Fabaceae	Tropical Africa
Cynodon dactylon (L.) Pers.	W	Poaceae	Tropical Africa
Cyperus rotundus L.	W	Cyperaceae	Uncertain?
Dactyloctenium aegyptium (L.) Richt.	W	Poaceae	Tropical Asia
Desmanthus vigratus (L.) Willd.	I	Mimosaceae	Tropical America
Desmodium incanum DC.	W	Fabaceae	Tropical America
Desmodium tortuosum (Swartz) DC.	W	Fabaceae	Tropical America
Digitaria ciliaris (Retz.) Koeler.	W	Poaceae	Tropical Asia
Echinochloa colonum Link.	W	Poaceae	Tropical Asia
Eleusine indica (L.) Gaertner	W	Poaceae	Tropical Asia
Fimbristylis dichotoma (L.)	W	Cyperaceae	Uncertain?
Ipomoea cairica (L.) Sweet.	W	Convolvulaceae	Tropical Africa
Ipomoea obscura (L.) Ker.	W	Convolvulaceae	Tropical Africa
Jatropha integerrima	W	Euphorbiaceae	Uncertain?

Kyllinga nemoralis (Forst.), Dandy. ex. Hutchinson & Dalziel	W	Poaceae	Old World Tropics
Kyllinga polyphylla Willd.ex Kunth.	W	Cyperaceae	Tropical Africa
Leucaena leucocephala (Lam.) deWit.	I	Fabaceae	Tropical America
Ludwigia octovalvis (Jacq.) Raven	W	Onagraceae	Tropical America
Luffa cylindrica L.	I	Cucurbitaceae	Tropical Asia?
Merremia peltata (L.) Merr.	I	Convolvulaceae	Japan
Merremia tuberosa (L.) Rendle.	W	Convolvulaceae	Tropical America
Mikania scandens (L.) Willd.	I	Asteraceae	Tropical America
Monstera deliciosa Lieberm	W	Araceae	Central America
Orthisiphon aristatus (Blume)	W	Lamiaceae	Americas?
Pachystachys spicata (Ruiz & Pavon)	W	Acanthaceae	South America
Pachystachys lutea Nees. Washause	W	Acanthaceae	Peru
Panicum maximum Jacq.	I	Poaceae	Africa
Paspalum setaceum Michx.	W	Poaceae	Tropical America
Passiflora foetida L.	W	Passifloraceae	Tropical America
Pennisetum polystachyon Schult.	I	Poaceae	Central America
Polygala paniculata L.	W	Polygalaceae	Tropical America
Pycreus polystachyus Beauv.	I	Cyperaceae	Uncertain?
Rubus moluccanus L.	I	Rosaceae	Asia?
Ruellia prostrata Poir.	I	Acanthaceae	Java, Indonesia
Saccharum spontaneum L.	I	Poaceae	Tropical Asia
Senna alata (L.) Roxb.	I	Caesalpiniaceae	Tropical America
Senna occidentalis L.	I	Caesalpiniaceae	Tropical America
Senna surattensis Burman	I	Ceasalpiniaceae	Australia- Southeast Asia
Setaria verticillata (L.)	I	Poaceae	Europe
Sida rhombifolia L.	I	Malvaceae	Tropical America
Sporobolus diander (Retz.) Beauv.	I	Poaceae	India
Stachytarpheta jamaicensis (L.) Vahl.	I	Verbenaceae	Tropical America
Stachytarpheta urticifolia Sims	I	Verbenaceae	Tropical America
Synedrella nodiflora (L.) Gaertner	I	Asteraceae	Tropical America
Thunbergia fragrans Roxb.	I	Acanthaceae	India- S E Asia
Tournefortia argentea L.f.	W	Boraginaceae	Indo-Malaysian
Tridax procumbens L.	I	Asteraceae	Tropical America
Vernonia cinerea (L.) Lessing	I	Asteraceae	Tropical America
Vigna marina L.	I	Fabaceae	Tropical Asia?
Vitex negundo L.	I	Verbenaceae	Mariana islands
Wedelia trilobata (L.) Hitche.	I	Asteraceae	Tropical America

I = Invasive species, W = Weedy species.

The following invasive plants in Kosrae are capable of invading the natural vegetation or causing serious losses to agriculture.

Merrimia peltata (L.) Merr. (Convolvulaceae) is widespread on Kosrae in the mangrove forest, agro-forestry system and the upland forest in all the four municipalities namely Tafunsak, Lelu, Malem and Utwe. They occupy and dominate the disturbed land / secondary forests as seen in the Tofol area. *Vigna marina* (Fabaceae) is more prevalent in the agricultural ecosystem and secondary forests but denser in distribution. They do not grow in the mangrove swamp but climb

over to mangroves from the ecotone between the tidal zone and dry land. *M. peltata* and *Vigna marina* cause extensive damage by invading agricultural land. They smother banana, taro, citrus and coconuts. *M. peltata* climbs over electric poles and causes problem with power distribution. *Cassytha filiformis* L. (Laurinae) is a leafless, green stemmed parasite. At present it is restricted to mangrove forest in Malem municipality. Being a parasite with a wide host range it is capable of causing extensive damage. Eradication by mechanical means is possible as it is confined to a small area at present.

Clerodendrum inerme (L.) Gaertn. (Verbanaceae) is well established along the coast and in the disturbed wetland. It is a slow invader into the agricultural land. Kosraeans grow them around the house because it is used in their traditional medicine. It is spreading slowly into the agroforestry system. *Clerodendrum quadriloculare* (Blanco) Merr., an invasive species in the nearby island Pohnpei, is not as aggressive in Kosrae, probably, due to poorer soil and drier climatic conditions in Kosrae.

Chromolaena odorata (L.) King and Robinson (Asteraceae) and *Wedelia trilobata* (L.) Hitche (Asteraceae). Both species are well established in Kosrae. Both of them initially started to spread from Tafunsak, where the Airport is located. Although *C. odorata* spreads easily in the open forest floor, *W. trilobata* remains to be a dominant weed in the more open, disturbed or agricultural land. Biological control could be the best option to deal with *C. odorata.*

Desmathus virgratus Willd. (Mimosaceae) and *Leucaena leucocephala* (Lam.) deWit (Fabaceae). Both species are in early stages of establishment on Kosrae. *L. leucocephala* was introduced about 3 or 4 years ago. *D. virgratus* was introduced about 2 years ago. Both of them remain as wayside plants at present in Tafunsak and Lelu municipalities.

Aeschynemone americana L. (Fabaceae) is a recent introduction but is spreading very fast and has established all along the roadside with heavy concentration in Tofol. *Luffa cylindrica* L. (Cucurbitaceae) is a fast growing, large climber destroying small trees in the agroforestry system by covering the canopy.

Panicum maximum Jacq. (Poaceae) and *Commelina diffusa* Burm. (Commelinaceae). These are the two most invasive grasses on Kosrae. They have invaded about 70% of the wetland used for taro production.

Saccharum spontaneum L. (Poaceae) and *Pennisetum polystachyon* Schult. (Poaceae). They are very recent introductions *S. spontaneum* has already spread between Tafunsak and Utwe municipals. *P. polystachyon* is still limited in itís distribution to a few localities.

Mimosa (invisa) diplotricha C. Wright ex Suavalle (Mimosaceae) and *Lantana camera* L. (Verbanaceae) listed by Space (2000) could not be located in Kosrae in our survey. We do not consider *Delonix regia* (Bojer) Rafinesque (Fabaceae) and *Spathodea campanulata* P. de Beauvois (Bignoniaceae) as invasive species in Kosrae, which were listed as invasive species in the PIER CD.

General considerations and conclusions

Of the methods available for control of alien species, prevention of entry into the island is the best method. Kosrae being a small island in the Pacific, is in a better situation to prevent introduction of alien invasive species, provided its quarantine regulations and enforcement are strengthened.

Lack of accurate literature on invasive species in the island and from the neighboring islands and countries with regular import and transit is a constraint. However, the situation may improve in the future, as there is growing awareness on the problems caused by the invasive species.

Most invasive species seem to establish first in and around the airports in Micronesia. Control of weeds near airports may reduce the introductions.

Local governments should make all efforts to eradicate the newly introduced invasive species. Assistance in the form of funding, literature and expertise should be provided to the islands in the Pacific.

Acknowledgments

We are grateful to the College of Micronesia and College of Micronesia-FSM and Kosrae State, FSM for their support. Species identification help provided by Mrs. Barbara Waterhouse, AQUIS, Australia is thankfully acknowledged.

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