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Field Release of the Biological Control Agent *Fergusonina turneri* Taylor (Diptera: Fergusoninidae) and its Obligate Nematode, *Fergusobia quinquenerviae* Davies and Giblin-Davis (Tylenchida: Sphaerulariidae) for the Control of *Melaleuca quinquenervia* (Cav.) S.T. Blake (Myrtales: Myrtaceae) in the Continental United States

Environmental Assessment
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1. Purpose and Need for Proposed Action

1.1 The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), is proposing to issue permits for the field release of a nonindigenous fly, *Fergusonina turneri* Taylor (Diptera: Fergusoninidae), and its obligate nematode, *Fergusobia quinquenerviae* Davies and Giblin-Davis (Tylenchida: Sphaerulariidae), in the continental United States. This environmental assessment was initiated through the permit application submitted by the USDA Agricultural Research Service. The agent will be released for the biological control (biocontrol) of *Melaleuca quinquenervia* (Cav.) S.T. Blake (Myrtales: Myrtaceae) (melaleuca). Before permits are issued for release of *F. turneri* and *F. quinquenerviae*, APHIS must analyze the potential impacts of the release of these organisms into the continental United States.

1.1.2 Fly biology. *Fergusonina turneri* and the nematode *Fergusobia quinquenerviae* have a mutualistic biology that causes galls on plant buds and young leaves of *M. quinquenervia*. *F. turneri* females have a lifetime production of up to 200 eggs and live approximately two weeks. Female flies are infected with parasitic female nematodes, nematode eggs, and nematode juveniles that persist throughout the life of the female fly. The female fly deposits multiple eggs and juvenile nematodes into developing *M. quinquenervia* buds (Currie, 1937). Nematodes induce the formation of galls in the bud. A single first instar fly larva and nematodes occupy the gall. Fly larvae feed on the gall tissue and complete development within the gall. The final larval instar creates a 'window' in the gall wall from which the adult fly later emerges. Mature galls, approximately one-half inch in diameter, are green to reddish-yellow and often appear as 'grape like' clusters of multiple fly chambers. No field data are available on the duration of the life cycle, but in containment the life cycle was about 60 days.

1.1.3 Nematode biology. The nematode is responsible for causing galls to form on melaleuca buds, and the fly is responsible for gall maintenance and for dispersal and sustenance of the nematode (Currie, 1937). The female fly deposits its eggs and juveniles of *Fergusobia* nematodes in plant tissue. As these nematodes feed and the gall begins to form, the nematodes develop into parthenogenetic (self-reproducing) females that lay eggs, producing both male and female nematodes. Mated females then invade mature female fly larvae (3rd instar). Inside the fly, they develop into parasitic female nematodes. The nematode parasite deposits its eggs into the fly's hemolymph (blood). The juvenile nematodes that hatch from these eggs move to the egg-laying tubes of the adult fly, and are deposited with her eggs into appropriate plant tissue, thus beginning the next generation.

1.2 The applicant's purpose for releasing *F. turneri/F. quinquenerviae* into the environment is to reduce the severity of infestations of melaleuca. The Australian broad-leaved paperbark tree, *Melaleuca quinquenervia*, commonly called "melaleuca", has become a successful invasive weed in south Florida because of its ability to produce large quantities of seed. Individual trees bear up to 100 million seeds. Massive, simultaneous seed release occurs after fire or when some other event causes drying of the seed capsules, but a steady seed rain occurs even without such an event. Densities of seedlings may be as high as 10,000,000 seedlings/hectare (ha). Seedlings grow into "dog hair" thickets of as many as 100,000 saplings/ha. Growth and development of the trees, along with simultaneous self-thinning, produces mature stands of 10-15,000 trees/ha. Individual trees can grow into localized stands. Localized stands initially form "domes" with larger founder trees near the center, tapering progressively towards smaller trees at the edges of the stand of trees. These merge with other stands to form expansive monocultures often covering hundreds of acres. Melaleuca has invaded more than a half-million acres in south Florida and over $25 million has been spent over the past decade to manage it, yet it continues to spread.

Melaleuca was first imported to south Florida as an ornamental tree around 1900. Later it was widely planted in wetlands as an inexpensive production method for the nursery trade in an attempt to produce a harvestable commodity. By the late 1970s, melaleuca became recognized as an invasive weed. It was added to the Florida Prohibited Plant List in 1990, and to the Federal Noxious Weed List in 1992.

Melaleuca has been difficult to control. Herbicide treatments or controlled burns cause the release of billions of seeds and result in thickets of saplings where only a few trees existed prior to treatment. These infestations are often in sensitive habitats that are difficult to access and hazardous in which to work. Moreover, multiple follow-up site visits are necessary to hand remove seedlings that continue to reappear from the remaining seed bank. Thus, although melaleuca trees can be killed using traditional methods, the inability to control reinvasion or to limit continued spread remains a problem. The primary aim of the environmental release of *F. turneri* and the nematode *F. quinquenerviae* is to hamper the ability of melaleuca to regenerate in cleared sites by decreasing seed production and reducing survival of melaleuca seedlings and saplings.

Before a permit is issued for release of *F. turneri/F. quinquenerviae*, APHIS needs to analyze the potential effects of the release of these organisms into the continental United States.

1.3 APHIS must decide among the following alternatives:

A. To deny the permit application (no action),
B. To issue the permit as submitted, or
C. To issue the permit with management constraints or mitigation measures.

1.4 Issues arising from the environmental release of *F. turneri/F. quinquenerviae* are:

A. Will *F. turneri/F. quinquenerviae* attack non-target plants within or outside of the area infested with melaleuca?

B. Will *F. turneri/F. quinquenerviae* adversely affect any federally listed threatened or endangered species or their habitats?

1.5 The pending application for release of these biocontrol organisms into the environment was submitted in accordance with the provisions of the Plant Protection Act (7 United States Code (U.S.C.) 7701 *et seq*.). This environmental assessment (EA) was prepared by APHIS in compliance with the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 *et seq.*) as prescribed in implementing regulations adopted by the Council on Environmental Quality (40 Code of Federal Regulations (CFR) 1500–1509), by USDA (7 CFR 1b), and by APHIS (7 CFR 372).

2. Alternatives Including the Proposed Action

2.1 This chapter will explain the alternatives available to APHIS. Although APHIS' alternatives are limited to a decision on whether to issue a permit for environmental release of *F. turneri/F. quinquenerviae*, other methods available for control of melaleuca are also described. These control methods are not decisions to be made by APHIS and may continue whether or not a permit is issued for environmental release of *F. turneri/F. quinquenerviae*. These are methods presently being used to control melaleuca by public and private concerns and are presented to provide information to the reader.

2.2 Description of APHIS' alternatives.

2.2.1 Alternative 1 - No Action: Under this alternative, APHIS would not issue a permit for the field release of *F. turneri/F. quinquenerviae* for the control of melaleuca. The release of these biocontrol organisms would not take place.

2.2.2 Alternative 2 - Issue the Permit: Under this alternative, APHIS would issue a permit for the field release of *F. turneri/F. quinquenerviae* for the control of melaleuca. This permit would contain no special provisions or requirements concerning release procedures or mitigating measures.

2.2.3 Alternative 3 - Issue the Permit with Specific Management Constraints and Mitigating Measures: Under this alternative, APHIS would issue a permit for the environmental release of *F. turneri/F. quinquenerviae* for the control of melaleuca. However, the permit would contain special provisions or requirements concerning release procedures or mitigating measures.

2.3 The following methods are presently being used to control melaleuca. These controls will continue under the "No Action" alternative and will likely continue even if a permit is issued for environmental release of *F. turneri/F. quinquenerviae.*

2.3.1 Chemical Control. The primary method used to remove large melaleuca trees involves cutting into the trunks then applying herbicide into the wounds. Herbicides such as imazapyr, or imazapyr in combination with glyphosate, are used. Fairly low concentrations of triclopyr products also work on cut stumps and greatly reduce non-target damage (K. A. Langeland, pers. observation., 2003). Often, crews must be transported to melaleuca infestations by boat or helicopter, which greatly adds to the cost of chemical treatment. Bodle *et al.* (1994) estimated the cost at $1.70 per tree. Expansive monocultures can be treated aerially using a mix of imazapyr, glyphosate, and methylated seed oil, but this method is not appropriate for use on small stands because of the impacts on native plant communities.

2.3.2 Mechanical Control. Melaleuca trees are removed with heavy equipment in accessible areas, such as along canals, utility rights-of-way, and in new housing developments. Seedlings and small saplings may be hand pulled, especially after the older trees are killed or removed. Mechanical removal is not appropriate for sensitive natural areas, which harbor much of the infestation, due to the habitat destruction caused by heavy equipment.

2.3.3 Biological control. The Australian weevil, *Oxyops vitiosa* Pascoe was released into the environment for biocontrol of melaleuca in April, 1997. It established throughout south Florida except at sites that are underwater for long periods of time (*i.e*., Loxahatchee National Wildlife Reserve) where the underground pupae cannot survive prolonged submergence. The melaleuca psyllid, *Boreioglycaspis melaleucae* Moore, was released in February, 2002. It has established in at least nine south Florida counties and is rapidly expanding its range, causing extensive defoliation of the trees. It performs best during the dry season and persists at wet sites but does not thrive during rainy periods. Scientists at the USDA-ARS Invasive Plant Research Laboratory in Ft. Lauderdale, Florida continually evaluate the impact of *O. vitiosa* and *B. melaleucae.*

3. Affected Environment

3.1 Distribution of the Target Weed

3.1.1 Native range. The center of origin of *M. quinquenervia* is northeastern Australia. Its range includes much of the coastal region from Sydney northward as well as New Caledonia and Papua New Guinea (Craven and Lepschi, 1999).

3.1.2 U.S. range. Melaleuca has been introduced into Florida, California, Louisiana, and Texas in the continental United States, but has not widely escaped cultivation except in Florida. Large trees in central Florida die back to the trunk after hard freezes then refoliate from dormant buds in the stem or trunk. Freezing temperatures kill smaller trees so melaleuca probably could not invade areas far outside of the current naturalized and cultivated distribution. It could potentially spread into coastal marshes of California and wetlands of Louisiana and Texas if seed sources were present.

3.1.3 Melaleuca invades many diverse, mostly low-lying wetland habitats including sawgrass marshes, cypress heads, mesic prairies, pine flatwoods, pastures, lake margins, highway rights-of-way, and ditch banks (Bodle *et al.,* 1994).

3.2 Plants Related to Melaleuca

The family Myrtaceae, the plant family to which melaleuca belongs, includes about 130 genera and 4,600 species of trees or shrubs (Mabberley, 1997). Most are tropical species and native to the Americas, Asia, and Australia. Various species have been cultivated, mainly for their fruits: guava (*Psidium*), rose-apple (*Syzygium jambos*), jaboticaba (*Myrciaria cauliflora*), Surinam cherry (*Eugenia uniflora*), oil of bay or bay-rum tree (*Pimenta racemosa*), allspice (*Pimenta dioica*), feijoa (*Acca sellowiana*), and bottlebrushes (*Callistemon* spp.). Eucalyptus (*Eucalyptus* spp.), which is often cultivated for timber, exists in Florida mainly in experimental plantings. In California, *Eucalyptus* is one of the most important shade and ornamental trees. Much of the planting of eucalyptus in the United States has been for ornamental and landscape purposes, especially in coastal areas of California and in southern Florida. However, some commercial plantations have been attempted in both States. Planting of *Eucalyptus* in Hawaii has expanded in recent years in anticipation of the wood chip market.

Thorne (1983) proposed 3 subfamilies of Myrtaceae: Psiloxyloideae, Heteropyxidoideae, and Myrtoideae. Other authors recognize only two: Leptospermoideae and Myrtoideae, which is the treatment used in this EA. *Melaleuca quinquenervia* is in the subfamily Leptospermoideae along with the introduced ornamentals, bottlebrush (*Callistemon*), eucalyptus (*Eucalyptus*), and manuka, (*Leptospermum scoparium*).

Other *Melaleuca* species in the continental United States (Arizona, California, and Florida), present in ornamental plantings or sold in the ornamental trade, are narrow- or needle-leaved species and are distinct from the broad-leaved *M. quinquenervia*. In Florida, no melaleuca species are currently available in the wholesale trade (http://plantfinder.com/). In Arizona and California, six narrow-leaved species have been sold: *M. decussata, M. elliptica, M. ericifolia, M. hypericifolia, M. nesophila,* and *M. styphelioides*. No *Fergusonina/Fergusobia* species are known from any of these species.

All eight native North American species of Myrtaceae occur only in Florida in the continental United States. All native Florida Myrtaceae and most introduced species are in the plant subfamily Myrtoideae. The native Myrtaceae in Florida include four genera: *Calyptranthes* (2 species), *Eugenia* (4 species) *Myrcianthes* (1 species), and *Mosiera* (1 species). None of these species are federally listed as threatened or endangered, but three are on the Florida endangered species list (*Calyptranthes zuzygium*, *Eugenia confusa,* and *E. rhombea*) and three are on the Florida threatened list (*Calyptranthes pallens, Myrcianthes fragrans,* and *Mosiera longipes* (Coile, 1998). All but *Eugenia confusa* are being promoted for commercial propagation in the native plant industry and are sold by native plant nurseries.

3.3 Evidence of host specificity of *Fergusonina turneri/Fergusobia quinquenerviae.*

Mutualism. The extremely narrow host range of *F. turneri* is the product of mutualism between the fly and nematode co-evolving with their plant host. Many species with associated Myrtaceous host plant species have been extensively studied and all have a similar one fly-one nematode host plant relationship.

The *Fergusonina/Fergusobia* association is an example of a unique, obligatory, mutually-beneficial relationship. Female flies transport their partner nematodes from plant to plant. The nematodes do not sterilize or harm the fly. Plant host choice is determined by the female fly when she lays eggs, thus affecting the ability of the nematode to initiate gall formation. The nematodes can not develop if the fly does not place them into a compatible plant. Likewise, the fly larva cannot develop if the nematode does not induce gall formation. Thus, there are many barriers to broadening the host range for these *Fergusonina/Fergusobia* associations.

Fergusonina/Fergusobia galls have been recorded, with one exception, only from genera in the subfamily Leptospermoideae. Melaleuca belongs to this subfamily. *Syzygium cumini* is the only species from a different subfamily (Myrtoideae) that supports *Fergusonina/Fergusobia* galls (Giblin-Davis *et al.,* 2003). Most host species support their own unique species of fly and nematode.

Currently, about 20 *Fergusonina* fly species have been associated with *Fergusobia* nematodes and myrtaceous plant species, but many remain undescribed (Giblin-Davis *et al.,* 2003). *Fergusonina/Fergusobia* associations have evolved to use hosts within the subfamily Leptospermoideae in Australasia. There are no native Leptospermoideae in the United States. Morphological and molecular comparisons within *Fergusonina* flies and *Fergusobia* nematodes from a variety of gall types, hosts, and geographical isolates show a high degree of host fidelity within the Myrtaceae (Giblin-Davis *et al.,* 2001a). Thus, because of the unique mutualism and host-specific co-evolutionary history, the *Fergusonina turneri/Fergusobia quinquenerviae* species association will remain restricted to *M. quinquenervia.*

Host specificity tests. *Fergusonina turneri/Fergusobia quinquenerviae* developed (by producing galls) only on the target host, *M. quinquenervia*, in quarantine tests. A list of plants tested is included in appendix 1. This supports Australian field studies which verified that galls on various species of broad-leaved melaleuca were each caused by separate and unique fly species paired with unique nematode species. Switching to an alternate host would not be predicted because of the complex life cycles of these obligate mutualists that are synchronized with one another as well as with the host plant.

F. turneri females did not probe buds of any non-myrtaceous species tested. They did probe buds of all but one myrtaceous species tested and deposited eggs and nematodes in six of the 11 species tested: two introduced ornamentals, *Callistemon citrinus* (both forms) and *C. viminalis* and four native species, *Eugenia axillaris, E. rhombea, Mosiera longipes* (Florida threatened list), and *Myrcianthes fragrans* (Florida threatened list). Galls were initiated only on *Callistemon* spp., the genus most closely related to *M. quinquenervia*, but all failed to mature even though the affected tissue grew abnormally.

Gall initiation did not occur on any native Myrtaceae. Abortion of some probed buds occurred due to mechanical injury. This did not seem detrimental to test plants inasmuch as it merely stimulated emergence of adjacent lateral buds (Goolsby *et al.,* 2002). Probing of buds of non-host Myrtaceae in the field is unlikely due to habitat differences (spatial limitations) between melaleuca and the non-target species, so the fly would not be expected to forage where native Myrtaceae are prevalent (Goolsby *et al.,* 2002). Furthermore, fly abundance will be temporally limited by the periodic availability of suitable melaleuca buds. The relative low supply of buds, compared to the amount of foliage available to leaf feeding biocontrol agents (*O. vitiosa* and *B. melaleucae*), will preclude the build up of massive populations that might lead to widespread spillover into these less suitable habitats or onto non-target plants (Goolsby *et al.,* 2002).

3.4 Threatened and Endangered Plant Species:

There are no federally-listed threatened or endangered plants within the plant family Myrtaceae in the continental United States. Outside of the continental United States, there are four federally endangered Myrtaceae in Puerto Rico, *Calyptranthes thomasiana*, *Eugenia haematocarpa*, *E. woodburyana*, and *Myrcia paganii,* and one candidate for listing, *Calyptranthes estremerae*. *C. thomasiana* also occurs in the British and U.S. Virgin Islands. In Hawaii, there is one known federally endangered

Myrtaceae, *Eugenia koolauensis*. Critical habitat has been designated for this species.

4. Environmental Impacts of the Proposed Action and Alternatives

4.1 This chapter will analyze the potential environmental consequences of each alternative.

4.2 Effects of Alternative 1 - No Action

4.2.1 Effects on Non-Target Organisms: The continued use of chemical herbicides, biocontrol, and mechanical controls at current levels would be a result if the "no action" alternative is chosen. Chemical and mechanical control is expensive, non-selective, and is potentially hazardous work. The biocontrol agents already released into the environment, are not completely effective in reducing melaleuca.

4.2.2 Effects on Threatened and Endangered: Impact on threatened and endangered species as a result of chemical biological, and mechanical control would be similar to effects on non-target species and habitats described in section 4.2.1.

4.3 Effects of Alternative 2 - Issue Permit

4.3.1 Effects on Non-Target Organisms: *Fergusonina turneri* and its associated nematode are not known to attack any species outside of the family Myrtaceae nor outside of the subfamily Leptospermoideae (the family and subfamily to which melaleuca belongs). The family Myrtaceae is represented in Florida by eight native species in four genera (*Calyptranthes, Eugenia, Myrcianthes*, and *Psidium*), and by melaleuca and several introduced species of *Callistemon* (*i.e.*, bottlebrush), *Eucalyptus*, and various other genera. The native species are in the subfamily, Myrtoideae, while melaleuca, bottlebrush, and *Eucalyptus* belong to the subfamily, Leptospermoideae. Both native and introduced species of Myrtaceae were subjected to host-specificity testing with *F. turneri* and its associated nematode. Host range testing showed that these organisms will develop only on *M. quinquenervia*, the target weed.

The potential benefit of *F. turneri* and its nematode is difficult to predict. However, if populations in the wild increase to levels observed in Australia, the potential benefit should be positive (Goolsby *et al.,* 2002). They are the first biological control organisms that have the potential to preempt flowering and seeding, thereby potentially reducing the regeneration capacity of melaleuca. Although the release of *F. turneri/F. quinquenerviae* is not expected to completely control melaleuca, they will contribute to the overall impact that biocontrol agents, such as *Boreioglycaspis melaleucae* and *Oxyops vitiosa,* have on melaleuca.

Because of specificity demonstrated in host specificity tests and the unique mutualism and host-specific co-evolutionary history of the *F. turneri/F. quinquenerviae* species, there will be no effect on non-target species, except for some possible gall formation on *Callistemon* species (introduced to the United States) and some potential probing injury to buds on native Myrtaceae .

4.3.2 Impact on Threatened and Endangered Species: No listed species within the family Myrtaceae occur within the continental United States. Listed species that occur in Hawaii, Puerto Rico, and the Virgin Islands would not likely be exposed to environmental release of *F. turneri/F. quinquenerviae*. In addition, because of the host-specificity demonstrated by these organisms and the unique mutualism and host-specific co-evolutionary history of the *F. turneri/F. quinquenerviae* species, there will be no effect on any listed threatened or endangered species or their critical habitat.

4.4 Effects of Alternative 3 - Issue the Permit with Specific Management Constraints and Mitigating Measures

4.4.1 Effects on Non-Target Organisms: No specific management constraints or mitigating measures have been recommended for this species. Therefore, under this alternative, impacts on non-target organisms would be identical to those described in 4.3.1.

4.4.2 Effects on Threatened and Endangered Species: No specific management constraints or mitigating measures have been recommended for this species. Therefore, under this alternative, impacts on threatened and endangered organisms would be identical to those described in 4.3.2.

4.5 No disproportionate effects are expected for minority, low income populations, or children due to the release of *F. turneri/F. quinquenerviae*.

4.6 An unavoidable effect of the proposed action would be the lack of impact on the target pest. The researchers have indicated that the impact that *F. turneri/F. quinquenerviae* will have on melaleuca is unknown.

Should the proposed action be unsuccessful, the present chemical, mechanical, and biocontrol activities would continue. In addition, researchers will likely continue to pursue additional, more effective biocontrol agents.

4.7 Once biological control agents such as *F. turneri/F. quinquenerviae* is released into the environment and becomes established, there is a slight possibility it could move from the target plant to non-target plants and itself become a pest. Host shifts by introduced weed biocontrol agents to unrelated plants are uncommon (Pemberton, 2000). However, if a host shift were to take place, the resulting effects could be environmental impacts that may not be easily reversed. Recent studies have highlighted the ecological risks associated with classical biological control (*e.g.* Louda *et al.*, 2003a, b), but where damage to nontarget plant species has occurred, it has resulted from imported insects that have adapted to eat physiologically acceptable but less preferred and less suitable hosts, in situations where the "preferred" host is not present (Louda *et al.*, 2003b). Laboratory host range testing has repeatedly been shown to accurately predict physiological host range, even though such tests may not always accurately predict ecological host range under field conditions (Pemberton, 2000; Louda *et al.,* 2003a, b).

Organisms used for biological control such as *F. turneri* and *F. quinquenerviae* generally spread even without the agency of man. In principle, therefore, release of these insects at even one site must be considered equivalent to release over the entire area in which potential host plants occur and in which the climate is suitable for reproduction and survival.

5. List of Preparers

This environmental assessment was prepared by Dr. Ted D. Center, Research Leader, USDA, ARS, Invasive Plant Research Laboratory, Fort Lauderdale, Florida, and Dr. Tracy Horner, Entomologist, USDA, APHIS, Policy and Program Development, Riverdale, Maryland.

6. List of Agencies Consulted

The Technical Advisory Group for the Biological Control Agents of Weeds (TAG) recommended the release of *F. turneri/F. quinquenerviae* on March 16, 2004. TAG members that reviewed the release petition (Goolsby *et al.,* 2002) included representatives from the U.S. Fish and Wildlife Service, Bureau of Indian Affairs, the Weed Science Society of America, Cooperative State Research, Education, and Extension Service, National Park Service, Environmental Protection Agency, National Plant Board, Bureau of Land Management, U.S. Forest Service, Animal and Plant Health Inspection Service, U.S. Army Corps of Engineers, and Agriculture and Agri-food Canada.

7. List of Reviewers

This document was reviewed by Dr. Robert Flanders, Pest Permit Evaluation Branch Chief, and Dr. Michael Firko, Assistant Director, Plant Health Programs, USDA-APHIS-Plant Protection and Quarantine, Riverdale, MD.

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Appendix 1. Test Plant List for *Fergusonina turneri/Fergusobia quinquenerviae*

Genus/Species	Common Name	Status in Florida
Introduced Myrtaceae in the Subfamily Leptospermoideae		
Callistemon citrinus (narrow leaved)	crimson bottlebrush	ornamental
Callistemon citrinus (broad-leaved)	crimson bottlebrush	ornamental
Callistemon viminalis	weeping bottlebrush	ornamental
Melaleuca quinquenervia	melaleuca, paperbark, punk	adventive weed
Native Florida Myrtaceae in the Subfamily Myrtoideae		
Calyptranthes pallens	spicewood	native, FL threatened
Calyptranthes zuzygium	myrtle of the river	native, FL endangered
Eugenia axillaris	white stopper	native
Eugenia confusa	redberry stopper	native, FL endangered
Eugenia foetida	Spanish stopper	native
Eugenia rhombea	red stopper	native, FL endangered
Mosiera longipes	long stalked stopper	native, FL threatened
Myrcianthes fragrans	Simpson's stopper	native, FL threatened
Introduced Myrtaceae in the Subfamily Myrtoideae		
Eugenia uvalha	uvalha	ornamental
Myrciaria cauliflora	jaboticaba	ornamental, commercial crop
Psidium cattleianum var. *cattleianum*	cattley guava	adventive weed
Psidium guajava	common or yellow guava	commercial crop, adventive weed
Introduced and Native Florida Non-Myrtaceae		
Family Lythraceae:		
Lagerstroemia indica	crape myrtle	ornamental
Family Magnoliaceae:		
Illicium parvifloram	yellow anise, star anise	native
Family Melastomataceae:		
Tibouchina granulosa	glory bush	ornamental
Family Myricaceae:		
Myrica cerifera	wax myrtle	native
Family Rosaceae:		
Photinia glabra	redtip	ornamental

Decision and Finding of No Significant Impact
for
Field Release of the Insect Biological Control Organism, *Fergusonina turneri* Taylor (Diptera: Fergusoninidae), and Its Obligate Nematode Symbiont, *Ferugsobia quinquenerviae* Davies and Giblin-Davis (Tylenchida: Sphaerulariidae) for Control of *Melaleuca quinquenervia* (Cavanilles) S. T. Blake (Myrtales: Myrtaceae) in the Continental United States

Environmental Assessment
January 2005

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), is proposing to issue permits for release of a nonindigenous fly, *Fergusonina turneri* Taylor (Diptera: Fergusoninidae) and an obligate, symbiotic, nematode associate, *Ferugsobia quinquenerviae* Davies and Giblin-Davis (Tylenchida: Sphaerulariidae) in the continental United States. The mutualistic association of these two organisms will be used by the applicant to implement biological control of *Melaleuca quinquenervia* (Cavanilles) S. T. Blake (Myrtales: Myrtaceae), an invasive weed species established as an escape from cultivation as an ornamental plant. APHIS has prepared an environmental assessment (EA) that analyzes the potential environmental consequences of this action. The EA is available from:

U.S. Department of Agriculture
Animal and Plant Health inspection Service
Plant Protection and Quarantine
Biological and Technical Services
4700 River Road, Unit 133
Riverdale, MD 20737

The alternatives available to APHIS are: (1) issue permits without any constraints,; (2) issue permits with provisions for implementing management constraints and/or mitigating measures; (3) no action (i.e., deny permit applications and do not issue permits). Since implementation of two of the options proposed by APHIS (issue permits without constraints; issue permits that require management constraints) will result in the release of the biological control organisms into the environment, APHIS has, therefore, analyzed the potential effects of releasing them into the environment.

The no action alternative, as described in the environmental assessment, would likely result in the continued use at the current level of chemical and mechanical control methods for the management of *M. quinquenervia*. The control methods described are not decision-making options for APHIS to choose and implement; they are ones currently used to control *M. quinquenervia* in the United States, and are likely to continue regardless of whether or not permits are issued for field release of *F. turneri* and *F. quinquenerviae*.

I have decided that an environmental impact study is not required to evaluate any of the proposed alternatives. I have decided to authorize the PPQ permit unit to issue permits for the field release of *F. turneri* and *F. quinquenerviae* without management constraints or mitigating measures. The reasons for my decision are:

o These biological control organisms are sufficiently host specific and will cause little or no environmental impact.

o All possible impacts of releasing these biological control organisms are insignificant and will not pose a threat to the biological resources of the continental United States.

o These organisms will not disproportionately affect minority or low-income populations, nor will they disproportionately affect children or create any environmental health risks or safety hazards to children.

o Release of *F. turneri* and *F. quinquenerviae* does not cause or represent a hazard to human health or wild or domestic animals.

o *F. turneri* and *F. quinquenerviae* will not have any adverse effects on any endangered or threatened species or their natural habitats.

While it is impossible to know with total assurance that release of *F. turneri* and *F. quinquenerviae* into the environment will be reversible, there is no evidence that these organisms will cause any adverse environmental effects.

Based on the analysis found in the EA, I find that none of the alternatives will have a significant impact on the quality of the human environment, so an environmental impact statement is not required.

/s/

Michael J. Firko January 13, 2005
Assistant Director
APHIS Plant Health Programs
Plant Protection and Quarantine