WEED INITIATED PEST RISK ASSESSMENT
FOR:Scientific name: Graminales, Poaceae, ROTTBOELLIA COCHINCHINENSIS (Lour.) W.D. Clayton (= R. exaltata L.f.) , Itchgrass, Raoulgrass, Corn Grass, Rice Grass, Guinea-fowl Grass.
This pest risk assessment by: William J. Graves, Area Identifier, Plant Pathology/Botany, USDA, APHIS, PPQ, Laredo, Texas, 06/14/2000.

STAGE I: Initiating Pest Risk Analysis (PRA) Process
Step 1. Document the Initiating Event for the PRA.

A. This pest risk assessment for *Rottboellia cochinchinensis* is to determine if *Rottboellia cochinchinensis*, since it is known to be in some southern states of the U.S.A., should be delisted or remain listed as a Federal Noxious Weed.

B. A pathway of large proportions has developed on the railroad lines coming out of Mexico, which already has and will continue to increase and cause infestations of this grass in other parts of the U.S.A.

Step 2. Identify and Cite Previous Risk Assessments:

Many studies of Itchgrass have been completed, but I have found no actual pest risk assessment, to this date. Itchgrass was listed in the regulations as a federal noxious weed in 1983 based on the recommendations of the Technical Committee to Evaluate Noxious Weeds (TCENW). TCENW was composed of representatives from the Agricultural Research Service, the Animal and Plant Health Inspection Service, the Agricultural Marketing Service and the Weed Science Society of America. This committee recommended for listing serious weeds of other countries if the weeds were either absent from the United States or of limited distribution. Weed risk assessment in the early 1980's consisted of checking world weed references for the most serious weeds, and then determining distribution in the United States. The TCENW did not propose for listing agriculturally useful taxa unless they posed dangerous weedy tendencies (Gunn and Richie, 1982).

Step 3. Establish Identity of Weed:

TAXONOMY: (After Cronquist)
Division: Spermatophyta
Subdivision: Angiospermae
Class: Monocotyledoneae
Subclass: Commelinidae
Order: Cyperales
Family: Poaceae
Common Name: Itchgrass, Raoulgrass. *Rottboellia cochinchinensis* (Lour.) W. D. Clayton Synonymy: R. exaltata L.f.

Diagnostic Characteristics: A tall, erect, strongly tufted annual grass; 1-3.5 m. tall; inflorescence a spike-like raceme with round spikelets compressed against the rachis; spikelets 4-5 mm. long, paired, without awns, one of the pairs is sessile, upper spikelets sterile; often rooting at the nodes; roots fibrous. Diagnostic features useful in distinguishing this species from other members of the genus include sharp irritating hairs on the leaf sheaths, the length of the spike-like raceme (3-15 cm. long) and spikelet length (3.5-6 mm. long). (Noxious weeds of the Federal Noxious Weed Act, No. 37). The origin of Rottboellia cochinchinensis is obscure, but it is thought to be a native of India, (MAFES Research Report, 1978), or is generally thought to be native to tropical Asia. It is found in the tropics and subtropics worldwide and is particularly widespread in the Caribbean region. Although Itchgrass is not reported to be in Mexico, USDA, APHIS,PPQ, Laredo, Texas, knows it is growing in Mexico, along the main north-south rail line from Mexico City to Laredo, Texas. In F/Y 1996-97, we in Laredo intercepted Itchgrass seeds on 256 railcars. In F/Y 1997-98, this increased to 515 railcars. In F/Y 1998-99, this decreased to 378 railcars. The problem about the decrease is that in 97-98, we intercepted less than 1000 seeds, but in 98-99, we intercepted at least 4000 seeds. The rairoad started a compliance agreement in the summer of 1999, and even though I trained ten of the contract rail workers, I feel they are missing a lot of seeds. These railcars travel all over the USA, so Itchgrass has a pathway to all states.

STAGE II: Assessing Pest Risk
Step 4: Verify Quarantine Pest Status: Regulatory and Geographic Criteria.

Regulatory: *Rottboellia cochinchinensis* is already listed as a Federal Noxious Weed, so importation and interstate movement are prohibited except under permit. The basis for its listing was: competes with and reduces yields of rotation crops, perennial crops, and pastures. (Federal Register, Final Rule, published 5/4/83, effective 6/3/83).

Geographic: Infestations of major importance of Itchgrass in the U.S.A. are in several places in North Carolina, Florida, Georgia, Alabama, Louisana, Arkansas, Mississippi, and East Texas. Florida and Louisana are trying to control the grass by various means, but have not been able to eradicate Itchgrass. Smaller infestations occur throughout the south, and as far north as southern Arkansas. These infestations, reportedly came from the grass entering around Miami, Fla., early in the 1900's. (Patterson, D.T., 1983).The infestation of Itchgrass in North Carolina, came with wildflower seeds purchased and planted along the highways in North Carolina. These wildflower seeds came from Wildseed Farms of Eagle Lake, Texas. (Cross,1999) This wildflower seed farm is approximately one mile from the main Union Pacific rail line from San Antonio, Texas, to Houston, Texas, so this seed may have entered Texas from Mexico, by rail. The Texas Dept. of Agriculture personnel surveyed this farm, and did not detect any Itchgrass. I visited this area on May 29, 2000 and found no Itchgrass at the town office site, however I found out this wildflower farm subcontracts the growing of wildflower seeds at numerous locations in the general area, and owns some of the farms. Several of these farms border the rail road lines. North Carolina has eliminated much of this infestation with methyl bromide and now only has to contend with only a plant or two seasonally, (Cross, 1999). An infestation along the side of State Highway 73, in Port Arthur,

Jefferson County, Texas, with a population of about 3000 individual plants extended about 100 m along the side of the highway. (Wipff, 1993). (This also is close to rail lines). Treatment results unknown.

Geographic: Itchgrass probably came from the West Indies into the United States. (Millhollon,1975). During the last 20 years it has become well established as a weed of sugarcane (hybrids of the genus Saccharum) in Louisiana and has spread to corn, (Zea mays L.), and soybean, (Glycine max (L.) Merr.), fields. Itchgrass could spread into crops throughout the United States, particularly the more temperate regions. In isolated experimental plots, it has grown vigorously and produced seed at Stoneville, Mississippi, Urbana, Illinois, and St. Paul, Minnesota. (Millhollon, 1975).Seed are spread from infested areas to noninfested areas primarily by machinery, such as harvesters, combines, hay bailers, roadside mowing machines, tractors, and trucks. From an abstract from (Millhollon R.W. et al, 1993), on the biotypes of *Rottboellia cochinchinensis*, Itchgrass biotypes from 34 countries were evaluated under controlled and natural day length at Houma, Louisiana. They could be placed in five broad groups based primarily on the effect of day length on flowering, but also on general morphology and pattern of growth. From this study, I feel that the Itchgrass entering on railcars through Laredo, can likely be a Group 4 biotype, the same biotype as the Louisiana 2 biotype, because the fully developed seeds we have intercepted have never been found prior to September 15th in each of the past years. The high point of fully developed seeds has always been in November. This would indicate the area in Mexico must have a photoperiod of 13 h., where the grass is growing, and this comes close to being around 22 degrees latitude, which is approximately the same as Puerto Rico, which has Group 4 biotype, and could likely be along the rail lines in Mexico in the states of San Luis Potosi, or Guanajuato.

Step 5: Assess Economic and Environmental Importance: Consequences of Introduction.

RE#1: Habitat Suitability: *Rottboellia cochinchinensis*, Itchgrass, should rate High, as it could attain up to 100 percent of its maximum potential growth in the South Atlantic States, the Gulf Coast States, the lower Midwest, and the Southwest, and up to 75 percent of its maximum potential growth in the Middle Atlantic States, the central Midwest and the Sacramento Valley of California. In cooler areas, such and New England, the northern Midwest, and the Pacific Northwest, itchgrass probably would attain less than 50 percent of its maximum growth. (Patterson, 1983). In relation to climatic tolerance, the possibility for continuing evolution of Itchrass leading to cool-adapted ecotypes, could be enhanced as it spreads northward from it's present distribution. Numerical Score: 3.

RE#2 Agricultural Damage Potential: Rottboellia cochinchinensis has proven to be a vigorous pest in Sugarcane, Corn, Rice, Cotton, Peanuts, Soybeans, Bananas, Cassava, Citrus, Cowpeas, Papayas, Pineapples, and Sorghum. (Holm et al. 1977). There are no effective chemical controls for Itchgrass in corn. There is currently available an effective chemical control for Itchgrass in soybeans. The species is also susceptible to glyphosate and MSMA, therefore it is very likely that effective control programs can be developed for rice levees, right-of-way, and noncrop areas. With the use of trifluralin and MSMA, Itchgrass can probably be controlled in sugarcane with an intensive program, although

more residual soil applied herbicides and more selective postemergence herbicides would be desirable. It has been estimated that Itchgrass could become as serious a pest as Sorghum halapense (Johnsongrass) if it is allowed to spread into the corn producing areas of the United States. Itchgrass is not a problem in rice fields, because it does not tolerate flooding, it grows on the levees and can be spread by harvesting equipment. (Patterson, D. T.1981). Itchgrass also has adverse effects on livestock and humans. If the weed growth is advanced, workers in some areas refuse to go into the fields for weeding, because the fiber-glass-like needles in the area of the leaf sheath can penetrate hands and clothing and result in painful infections. In Ceylon it is considered to be dangerous for stock because the stiff hairs may lacerate the animals' mouths and intestines.(Holm, L.G. et al. 1977). *Rottboellia cochinchinensis* is an alternate host of rice leaf gall virus and corn leaf gall virus.(Agati and Calica, 1950). Agricultural Damage Potential Rating--High 3, Weed affects four or more species of agricultural plants and/or animals.

RE#3: Dispersal Potential: Reproductive output: Under certain conditions, as many as 4,400 joints may be produced by one mature plant (Pamplona et al 1974). A plant can produce an average of 99.5 tillers, and as many as 16,54l seeds in one growing period. Of the seeds produced 5,310 to 9,03l were empty. (Fernandez, 1979). Itchgrass was able to remain viable at depths of 45 cm, indicating an excellent mechanism of escaping the effects of most soil applied herbicides The presence of viable spikelets at depths of 45cm. In cultivated soil supports the view that the deeper the seed burial the longer the survival, and that plowing enhances the survival and persistence of the seed by burial. (Bridgemohan, et al,1991). Dispersal of Itchgrass can be facilitated by running water in rivers and canals, and may reach irrigated or flooded areas. Seed may also be transported down the slope within a field by soil erosion. Smaller birds and mammals did not disseminate Itchgrass seeds. Generally the activities of man and transport by water are probably major disseminators of this seed. Although seeds do not adhere to clothing, they may fall into a pocket, shoe, trouser turn-up, etc., and be carried this way. Seed may also be carried in harvesting equipment, grain bags and other containers, hay, silage, manure etc. (Thomas, 1971). Dispersal Potential High, with a numerical score of 3.

RE# 4: Economic Impact:
1. Reduced Crop Yield: Itchgrass has reduced corn (*Zea mays* L.) yields in the Philippines by 63 to 80% (13) and in Rhodesia by 46% (17). Louisiana sugarcane yields were reduced 43 % by Itchgrass competition (8). The competitiveness of Itchgrass with soybean, along with its prolific seed production capacity, support the need for implementation of an effective Itchgrass management program. (Lejeune, et al, 1994). Itchgrass can be possible disease carriers to Corn and Wheat crops. Itchgrass is distributed widely in the tropics and serves as a natural host of several maize viruses and their vectors. (Rose, 1973). Natural infection of maize with the virus described here, has not been observed at the International Institute of Tropical Agriculture, in Ibadan, Nigeria, but infected Rottboellia plants have consistently been found in the Ibadan area. The virus has been proposed to be designated as Rottboellia yellow mottle virus (RoYMV). The data presented in this report indicates that RoYMV is a hitherto undescribed virus. It has an extremely restricted host range, being transmissible only to *R. cochinchinensis* (native host) and to *Zea mays*. No information is available as to the

identity of its vector. (Thottappilly, et al 1993). In another recent aspect of the possibility of Itchgrass spreading diseases, in Laredo, Texas, between September 15, 1999, and December 15, 1999, PPQ intercepted Itchgrass seeds from railcars six times that had Karnal Bunt (*Neovossia indica*) , spores hitchiking on them. These spores were discovered by me because of the black ends of the seeds, which were largely dirt. These were forwarded to Dr. Mary Palm at Scientific Services, USDA, ARS, Beltsville, MD. Dr. Palm and Lisa A. Castleberry confirmed the presence of Karnal Bunt spores. They agreed with my theory that the spores were just hitchiking in the soil on the seeds. Possibly these seeds passed through a facility or field where the Karnal bunt spores were present. Regardless, Itchgrass seems to be a pathway for the spores to travel to American wheat fields.
2. Itchgrass is capable of lowering the commodity value because of increasing cost of production, and increasing costs of control. (Plowing and herbicides necessary to control) 3. In the future, there could be a large loss of markets due to the presence of Itchgrass. Farmers in the corn and wheat areas would not want to buy agricultural seeds for planting from areas infected with Itchgrass, nor would other foreign countries where itchgrass is not present. Itchgrass is able to cause all three of the above impacts. Rating High, with a numerical score of 3.

RE#5: Environmental Impact:
1. Itchgrass can impact natural community composition, affect native populations, and affect endangered or threatened species.
2. Itchgrass could have sociological impacts on recreation patterns and property values.
3. Itchgrass could stimulate control programs including toxic chemical pesticides or introduction of a nonindigenous biological control agent.
4. Itchgrass can have an effect on human health by causing skin irritations, just as it does on livestock. Rating high with a numerical score of 3.

ECONOMIC AND ENVIRONMENTAL IMPORTANCE SUMMARY: Risk: Consequences of Introduction: High, with a cumulative risk element numerical score of 15.

STEP 6: Assess Likelihood of Introduction/Spread:
RE# 6: Entry Potential: Number of Potential Pathways and Likelihood of survival in each:
1. Survive postharvest treatment: It is as difficult as ever to control *R. exaltata* with herbicides, even though a number of herbicides are known to have a reasonable satisfactory action. From more than 30 herbicides tested in Columbia, only trifluralin 1.5 kg/ha gave a good control. (Thomas, (1970). At present, no postharvest treatment in known. Rating High.
2. Survive shipment: Because of its spread by railcars, the answer is obviously high. It does survive.
3. Not be detected at the port of entry: We feel Laredo, Texas, has been for years , the primary entry point of Itchgrass seeds into the United States, and we sure haven't detected all of the seeds that have passed through. Rating High.

4. Importation and movement of Itchgrass seeds to an area of suitable environment has been done, and will continue to increase. Rating High.
5. Itchgrass will eventually come into contact with suitable growing substate and host material for diseases throughout the lower half of the United States. Rating High.

LIKELIHOOD ESTIMATES FOR RISK ELEMENT # 6: High, greater the 10% in all 5 elements: Numerical score 5.

PATHWAYS:
A. Railcars: Rottboellia cochinchinensis can easily survive shipment from far south in Mexico. seeds can be knocked off of railcars by hitch-bumping, and speed of the trains. Detection of Itchgrass seeds in Laredo: on railcars we estimate we are only detecting about 30 % of the seeds. Itchgrass can germinate and grow in good soil or undisturbed areas, such as farm fence lines and ranches.
B. Auto and Cargo vehicles: Itchgrass can easily be transported throughout the United States in passenger baggage, hitchiking on vehicle parts, and in seed shipments.
C. Harvesting Equipment, Trucks, Earthmoving Equipment, Soil Importations can harbor Itchgrass seeds, and spread them from present infestations to many parts of the U.S.A.

Pathway	Survive	Survive	Not Be	Environment	find host/	Path total
	treatment	shipment	detected	suitable for survival	growing	substrate
A.	5	5	4	5	5	24
B.	5	5	5	5	4	24
C.	5	5	5	5	5	25

Total across pathways: Risk: Likelihood of Introduction: Cumulative pathway score 73: High Risk score 3.

STEP # 7: Conclusion/Pest Risk Potential: Consequences of Introduction Score + Likelihood of Introduction Score: High with a numerical score of 6.

Comment: Because of its presence in several areas of the U.S.A., Itchgrass should not be de-listed from the Federal Noxious Weed List. Section 3(c) of the Federal Noxious Weed act (7 U.S.C. 2802 (c) defines a noxious weed as "any living stage (including, but not limited to, seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin, is new to or not widely prevalent in the United States, and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interest of agriculture, including irrigation, or navigation or the fish or wildlife resources of the United Sates or the public health." By the results of the above assessment, Itchgrass is not widely prevalent in the United States, can cause great harm, and can spread into other farming parts of the country, and have serious impacts on all areas. Efforts should be made to further restrict the weeds entry into the country and the spread from its present ranges. The weed is at present not in some of the vast farming states of the union, and I feel the USDA should take new actions to assist the presently

infected states in control and eradication of this weed, and increase actions to prohibit entry of the plant parts from other countries, and implement new survey efforts to find and eradicate new infestations as they might occur. One main effort needs to be accomplished: The Federal Government through the USDA needs to require all states to enact a state noxious weed law. There are 11 states that do not have one. Without a state law, state agricultural authorities have no legal authority to do anything about noxious weeds. The state of Texas, for instance, has a Noxious Weed Control District Act in effect since September, 1981, and still has no Noxious Weed Law.

STEP # 8: Document the PRA:
A. Databases: USDA, Invasive Plant Species. The Plant List of Accepted Nomenclature, Taxonomy, and Symbols Plants Database.

B. Publications:
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