Oryza rufipogon

Introduction

Oryza rufipogon, red rice, derived its name from the colour of the unhulled grain, which can vary from deep red to pink. Pigmentation is limited to the pericarp; the endosperm is always white. The panicles of *O. rufipogon* shatter readily before or during harvest, so that the paddy fields become thoroughly infested with dropped seeds, which can grow with the following crop and can also remain viable in the soil for several years.
O. rufipogon crosses with *O. sativa* and, as the red of the pericarp is dominant, all the F1 progeny and three quarters of the F2 (3:1) will have red grains. It is difficult to remove all the red pericarp during milling and it is necessary to mill much closer, resulting in more broken grain and a higher percentage of bran; also, it detracts from the appearance of the final product. Red pericarp also occurs in some *O. sativa* cultivars.
Red rice is a noxious weed in over 50 rice-producing countries. The level of infestation of red rice greatly affects rice production, both yield and quality. A density of 20 to 32 plants/m^2 can reduce yield by 57 to 64 %. Red rice is generally taller, tillers more and produces more straw than commercial plants. Red rice contamination increases milling expenses to remove the colored aleurone layer. It cannot be distinguished from white rice in the field until after flowering and the early stage of grain formation, so that rouging is difficult.

Identity

Authority : Griff.
Classification
Kingdom :Plantae
Phylum : Angiospermophyta
Class : Monocotyledonae
Family : Gramineae
Genus : *Oryza*
Species : *rufipogon*
Synonyms : *Oryza sativa, O. barthii* Chev., *O.longistaminata* Chev & Roellr.,[Africa], *O. rufipogon* Grill., *O.glabrina*., [Asia] *O. punctata.* Kotcshy ex Steud.
Common name: Red rice
Role : Pest

Morphology

Red rice is a tufted annual grass belonging to the same genus as commercial rice- *Oryza sativa*. Culm, 60 - 330 cm tall, often erect, genticulate and branching at the base; leaf linear and lanceolate, ligule 15 - 45 mm long, membranous, with acute tip inflorescence – a strict

panicle eventually drooping, approx, 20 cm long; spikelets often laterally compressed, pedicelled, 20 - 2.5 cm wide, disarticulation above the glumes which are rudimentary.

Red rice belongs to the same genus as the commercial rice varieties planted. The morphological, physical, physiological and biochemical characteristics are similar in both varieties. **The following morphological traits differ from *O. sativa*:**

- **Greater height at maturity**
- **Earlier flowering – 94 days after emergence (dae)**
- **Earlier harvest and shelling of seeds – 102 to 120 (dae)**

Biology & Ecology

Red rice grains readily shatter before harvest and they remain viable and dormant from 2-3 months to 3 years in the soil. Since it is morphologically and physiologically similar to commercial rice, its selective removal is difficult. Heavily infested fields are often abandoned.

Dispersal / vectors

Red rice shatters before harvest and the dropped seed are thus dispersed. Seeds are also dispersed by animals and man, through and the use of contaminated crop seed.

Management

The widespread use of contaminated seeds by farmers ensures re-infestations. Control can be improved through good agronomic practices and the use of chemicals.

Cultural control

Land preparation either under dry conditions or under water.
Burn harvest residues.
Water management by flooding
Control of plant population.
Plant pre-germinated seeds (broadcasting) or transplanting.
Rouging at low infestation levels
Rotation with other crops e.g. soybean.
Use of uncontaminated seed

Chemical control

Use of: -

Herbicides
Pre-emergence - Oxyfluorfen
Non-selective - Glyphosate and paraquat
Molinate and Fenoxaprop (ppi)

Pest Significance

Red rice is morphologically and physiologically similar to commercial rice. Therefore selective removal of red rice from commercial crops is difficult. Heavily infested fields are often abandoned. Red Rice has similar pest problems to commercial rice, viz, Hoja blanca viruses, *Alternaria spp., Sogatodes spp., Oebalus spp., Aphelenchoides besseyi*

In breeding and maintenance plots, red grains can be detected by soaking the seeds in water, so that they can be removed. *O. glabrina* is a mutation of wild rices and is the major red rice found in the Caribbean. In some cultures, red rice is a specialty rice. This is not to be confused with wild or black rice. The straw has been used as livestock feed and for thatching. The weed has been problematic in Guyana as early as 1951 and in Trinidad in the 1970s.

Inspection Procedures:

The major source of infestation externally to the producing country is the importation of contaminated seed material. It is important that all seed to be used as planting material be certified, i.e., it must be produced in certified seed plots and be accompanied by a Seed Quality Analysis Report from a reputable Laboratory . This should state the level of red rice contamination. According to the International Standards, 2 or 3 grains of red rice per kilogram of seed material is acceptable.

Host Notes

The weed is found mainly in rice paddies.

Distribution

In Colombia and Guyana, 20 and 80%, respectively of commercial fields are contaminated. Red rice is also found in the USA, Venezuela, Trinidad, Suriname, Cuba, Brazil, S.E Asia, India, Indonesia, Philippines and Australia.

Bibliography

Bridgemohan, P. (1999) Rice Varietal Competitiveness against red rice infestation. Paper Presented at the First Mechanized Rice Symposium, Guyana.

Smith, R, Jr. (1981) Control of red rice in water seed rice. Weed Sci. 29: 663 – 666.

Web Resources -

http://www.irri.org/irrn262genetic.pdf

http://www.pi.cdfa.ca.gov/weedinfo/ORYZA2.html

http://www.nig.ac.jp/labs/nenpo-95e/E/E-b.html

http://www.cdfa.ca.gov/phpps/pe/page58.htm

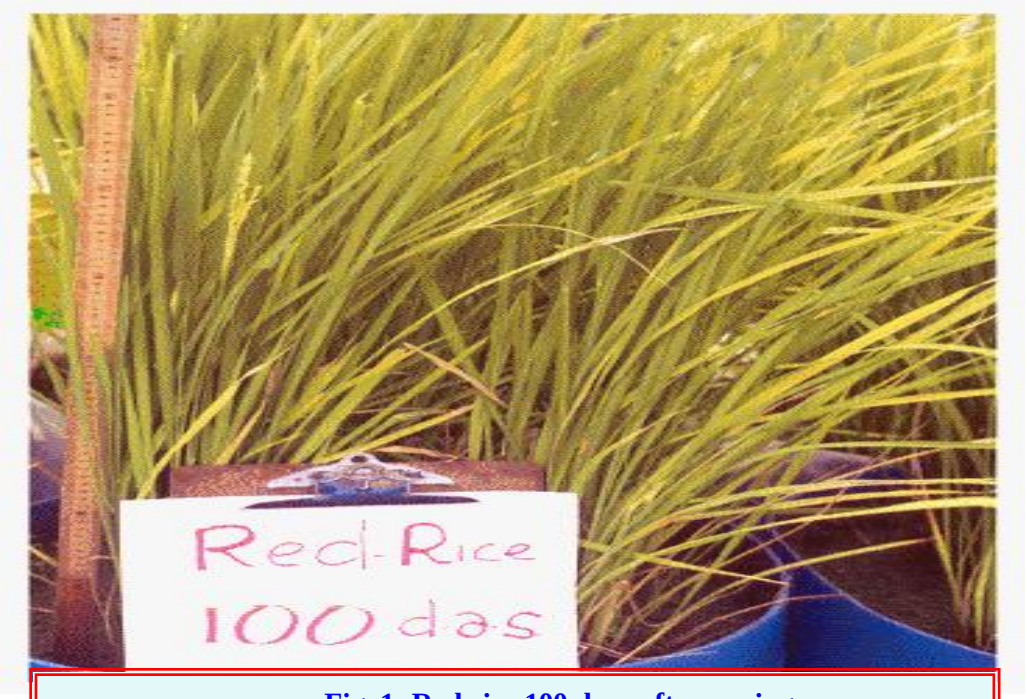

Fig. 1: Red rice 100 days after sowing

Fig. 2: Plant heights of Red Rice & Oryzca 1 at maturity 94 days after sowing