

Webinar on **Red Rice, It's Economic Importance and Management** will commence at 10:00 am



Webinar On

Red Rice, It's Economic Importance and Management

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What is Red Rice?

- Red rice can be defined as any spontaneously and strongly shattering rice that occurs in cultivated rice fields.
- It is referred to locally as:
 - Weedy rice
 - Jharanga
 - Overhead/overhang
- Due to its similarity to cultivated rice, it is regarded as a problematic weed since its control by chemical means is limited.

Economic Importance

- Red rice reduces farmers income:
 - Quantitatively (yield reduction)
 - Qualitatively (market value).
- It competes with cultivated rice for limited resources such as moisture, nutrients and space.
- Due to red pigmented pericarp, an extra milling is required which cause breakage of grains.
- Red rice is an alternative host for pest and diseases. In cases of high infestations it leads to lodging.

Yield Losses Due to Red Rice

- The threshold for weedy rice infestation is 1-3 plants m⁻
 ² in the USA; plant density higher than this can cause significant yield loss.
- The yield losses from weedy rice have been estimated to vary from 10-100% due to their competitive ability in Sri Lanka (Marambe and Amarasinghe, 2000).
- A yield loss of 60-74% in direct-seeded rice is expected with a 35% infestation level (Watanabe *et al*, 1997).

Yield Losses Due to Red Rice

 A density of 40 weedy rice plants m⁻² can result in as much as 60% loss in yield in Italy (Eleftherohorinos *et al.* 2002)

The presence of weedy rice at 2, 4, 6, and 8 plants m⁻² reduced cultivated rice production by 24.9, 31.4, 33.7, and 60.1%, respectively in China (X. MU *et al*, 2018).

Yield Losses Due to Red Rice

In Guyana

- About 20 variants of red rice found
- Infestation levels varies from 1 to 95 %
- Significant yield loss recorded
- 10 to 15 bags per acre as compared to over 35 bags per acre in red rice free fields
- Very low prices offered at the mill

Characteristics of Red Rice

- Prolonged dormancy periods
- Vigorous vegetative growth
- Aggressive competitors and heavy feeders of nutrients
- Heavy seed producers
- The ability to withstand harsh conditions
- Early maturity
- The ability to shatter their seed before the crop is harvested.



Red rice can be taller or shorter or of similar height to cultivated rice.



Weedy rice has a long awn, Long, thin-grained rice with black hull, Exhibit more rapid seedling growth when compared to the cultivated rice, Internodes color may be purple



Awn colour



Internode colour



Stigma colour







There are variations in the husk colour of red rice







Handgrip → test for shattering of weedy rice

Theories on the Origin of Red Rice



How Red Rice is Spread?



Source: Singh et al., 2013

Ecology of Red Rice

- Emergence is dependent:
 - on soil texture
 - presence of water in the field
 - depth of seed burial
 - type of tillage operation used.
- It is greater in moist soil vs flooded soil
- At increasing flood depth, there is lower percentage in red rice emergence.

Ecology of Red Rice

- It's emergence from the seed bank is greater with the rome plough than with the disc plough.
- Early seed viability:
 - 20 % germination at 9 days after flowering (DAF)
 - 85 % at 12 DAF.

Benefits of Red Rice

Besides being a delicacy, Red Rice has the following benefits:-

- It promotes weight loss as the fat content is zero while being rich in soluble and insoluble fiber.
- It is rich in iron and vitamins; the antioxidants in red rice protect the skin from premature ageing.
- It helps to keep heart diseases at bay and is highly recommended for patients with diabetes.
- It helps in digestion and reduces fatigue.



Strategies for Managing Red Rice

- This can be achieved mainly by:-
- Preventing the germination and establishment of red rice seeds present in the field.

- Preventing the growth and establishment of red rice through the introduction from other means.
- Preventing the spread to uninfested fields.



Burning of Straws

- Ensure combine harvester cut as low as possible
- Spread straws over entire field
- Allow straws to dry properly (3-5 days) before burning



Grow-Out Method

- Dry land preparation (preferably 2 rounds of rome ploughing)
- Ensure field has adequate moisture for seeds to germinate
- Chemical or mechanical measure could be applied (2-3 leaf stage)



Stale Seedbed Method

- Complete all land preparation operations
- Keep field moist (not flooded)
- Encourage germination of seeds
- Apply chemical control (glyphosate) at 2-3-leaf stage

Deep Ploughing

- Deep plough under dry conditions to bury weed seeds
- Follow-up with light tillage (preferably rome ploughing)
- This will ensure buried seeds are not brought back to the surface

Puddling

- Use of rotary tiller
- Minimum of 2 rounds of puddling
- Seeds are buried deep so as to prevent germination



Cleaning of Machinery

- Clean all machines and implements soon after the completion of any operation in weedy fields before entering other fields
- Ensure complete removal of all mud and plant materials
- In large-scale operations, dedicate special machines and implements for weedy fields



Field Sanitation

- After harvesting, spread straws on bunds (meres) and dams to ensure weeds and seeds are destroyed by fire
- Light harrowing on dams can help with weed control
- Once chemical weed control is done in field and treat dams
- Monitor dams and control weeds to prevent reinfestation

Land Leveling

- After dry land preparation, level fields with laser land leveler
- Use implement in all parts of the field
- Prevent soil movement during wet operations
- Keep bunds (meres) in uniform height for even flooding



Bunding

- Use irrigation water as a guide
- Flood field partially to identify low areas
- Place bunds (meres) to separate low and high areas into smaller fields



Choice of Variety

- Use varieties with early rapid growth vigour
- High leaf area and early canopying effect
- Varieties that can emerge under deep flooding
- Tall varieties
- GRDB 14 a suitable variety

Seed Rate

- Use higher seed rate to compete and smother weeds
- 140 160 lbs of certify seed per acre

Seed Treatment

- Before sowing, treat seeds with insecticide
- Use recommended rates of insecticide and water



Use Clean/Certified Seed

- Use only certified seeds
- Commercial grade of paddy should be sold to the mill
- Ensure seeds are cleaned before sowing



Field Exposure and Flood Depth

- Choose varieties that can emerge and grow through a depth of 4" – 5" of water
- Maintain flood conditions after sowing
- When draining for weed control, do not expose fields for more than 2-3 days
- After weed control, re-flood and maintain 4" 5" water



Removal of Old Roots & Stubbles

- Uproot and remove all old roots from field after land preparation
- Burn all old roots on dams when dry
- Repeat process, if necessary, up to the period just before 1st application of nitrogen

Early Nitrogen Application

- Apply moderate dose of N-fertilizer at 1st application of 55-75 lbs per ac at 12-14 days after sowing.
- Apply total N-fertilizer for the season in 3 splits

Rogueing Before Flowering

- Inspect fields between tillering to flowering stages
- Remove red rice plants manually by uprooting
- Burn weeds on dam when dry

Wick/Rope Method

- Use varieties that are short in height
- Treat weedy/red rice before they attain grain-filling stage
- Using a systemic herbicide, make a 25% mixture
- Wrap a cotton rope around a stick
- Soak rope with mixture
- Gently touch weeds at their growing tips with the soaked rope
- Prevent touching rice plants





Effect of the rope method to control red rice in farmer's field





Other Methods of Control

- Spot spraying of densely populated spots
- Continuous rogueing on sparsely populated red rice field
- Cleaning of combine harvester
- Cleaning of transport containers, drying floors and storage area

Herbicide Resistant Varieties

• Clearfield rice

Challenges

- Absence of proper drainage and irrigation infrastructures in some areas
- Absence of preferential pricing systems locally
- Large number of farmers are renting lands and are reluctant to engage in red rice control measures for fear of lands being repossessed.
- Fear of increasing cost of production
- Quite a large amount of farmers do not use seeds that are certified

Conclusion

- The main sources of red rice infestation are rice seeds contaminated with red rice seeds and in the soil.
- Only through the integrated approach can red rice infestation be effectively reduced.

 Therefore any control measure should be to aimed at the reduction of infestations from these sources.



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Thank You for Tuning in!!!



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