International Journal of Research in Engineering, Science and Management
Volume 5, Issue 7, July 2022
https://www.ijresm.com | ISSN (Online): 2581-5792

A Review on Systems of Rice Cultivation

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***Abstract*: Rice has taken care of more individuals throughout a more extended timeframe than some other yield. As far back as 2500 B.C. rice has been archived in the set of experiences books as a wellspring of food and for custom also. Starting in China and the encompassing regions, its development spread all through Sri Lanka, and India. It was then gone to Greece and region of the Mediterranean. Rice spread all through Southern Europe and to some of North Africa. From Europe rice was brought to the New World. From Portugal it was brought into Brazil and from Spain to Central and South America. Rice could be taken to many regions of the planet because of its adaptability. It can fill in the desert states of Saudi Arabia, in the wetland deltas of Southeast Asia in the overflowed rice fields which we are generally acquainted with. In the view of importance of systems of rice cultivation, this paper tries to provide the information about the systems of rice cultivation.**

***Keywords*: Rice, Lowland, Upland, SRI.**

1. Introduction

Rice is a staple food crop of more than 60% of the world's population. It is also staple food crop more than 70% of the Indian population. Asia accounts for about 90% of the world's rice area & production. Pakistan, Indonesia and Japan are the important rice growing countries accounting for 7% of the world's total area.

Rice is primarily a high energy food. The protein content of milled rice usually 6-7%. Rice is a semi-aquatic crop grown on wide variety of soils including alluvial, red, laterite, black, mixed red and black, greyish brown, sub mountainous, saline, alkaline, acidic, peaty and saline-peaty soils. Rice is a thermo-sensitive plant. Temperature required is 21-37 degrees.

Rice is primarily a high energy food. The protein content of processed rice is typically a 6-7%. Amino acids content in rice is very practically identical with different grains. The fat substance is low in rice.

Oryza sativa is grown in the majority of the rice developing nations of the world. Oryza sativa is diploid having 24 chromosomes. The sativa assortments of the world are ordinarily gathered into three sub species that is India japonica and javonica.

2. Systems of Rice Cultivation

1. Rainfed upland system or dry or semi- dry system
2. Lowland system or wet system
3. SRI (System of Rice Intensification)
4. Direct seeding or Broadcasting of sprouted seeds

1) Rainfed upland system or dry or semi-dry system

Land preparation: Ploughing, harrowing of field followed by FYM and bund formed is required.

Seed treatment: Seeds are treated for quick germination, control of diseases, crop and pest infestation.

Time of sowing: End of June and first week of July immediately after sufficient rains when 12-15cm soil layer becomes yet. Dry sowing before onset of monsoon. Two or three crops during kharif, summer are taken in a year.

Fertilizer management: FYM application at 4-6 weeks before sowing. Total dose 60:30:30 kg/h in three split doses.

First dose: 25:30:30 NPK kg/h at the time of land preparation

Second dose: 50%N during tillering

Third dose: 25%N during panicle initiation.

Weed management: Weeding 30-40 days after sowing (DAS)

The way to deal with crop foundation and weed administration for rice has gained attention during most recent couple of years in Asia. The ranchers are fundamentally having an impact on the ways to establish crop and oversee weeds due to obstacles because of inaccessibility and rising cost of significant assets, for example, work, water and the energy. Besides, the normal efficiency of rainfed relocated rice in Asia is declining due to climate fluctuation. Cultivating of rice seeds after dry-culturing is a common practice in rainfed upland, marsh, and flood inclined areas of Asia, and had recently got consideration from ranchers in inundated regions with water scarcity. However, this favours development of profoundly aggressive weeds causing significant losses in grain yield as high as 91 to close to 100%, emerging out of unfortunate supplement and water use proficiency by the harvest. Ideal plant thickness upgraded development and yield of DSR, yet decrease in plant thickness should be supplemented with effective weed administration for economical yield

2) Low land system or wet system

Rice nursery: Nursery is prepared on well drained, fallow soil, near irrigation source using any of the adequate methods like,

1. Dry nursery
2. Wet nursery
3. Dapog method

Field preparation: Plough the soil for 20-25cm deep in summer.

- Keep the field flooded with water for 15 days
- Prepare earthen bunds of 30cm
- Height above the field before puddling

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- Puddle 3-4 times with puddler in standing water.
- Apply 50% N and full P and K at last puddling 10-15cm deep soil.

Transplanting:

For Kharif: Uproot and transplant seedlings of 20-30 days old with 4-5 leaves and height 15-20cm. TIME: First fortnight of July

For rabi: Seedlings of 30-35 days old are ideal for transplanting. TIME: Last week of December to middle of January.

Spacing:

Kharif: 20 - 10 cm or 20 – 10 cm

Rabi: 15-10 cm or 15-15 cm is ideal

Torpidity is the disappointment of good quality mature seeds to grow under ideal circumstances. Torpidity of newly collected seed ought to be broken by utilizing heat treatment at 50°C in a stove if accessible or by putting the seeds on a plastic sheet and covering with itself or one more under direct daylight for 1 or 2 days. Corrosive treatment may likewise be utilized.

- *Acid treatment:* absorb seeds for 16 to 24 hours 6 ml of concentrated nitric corrosive (69% HNO3) per litre of water for each 1 kg of recently gathered seeds. In the wake of splashing, channel corrosive arrangement off and sun-dry the seeds for 3 to 5 days to a dampness content of 14%. Store in dry circumstances for planting.
- Conduct germination test on seeds to lay out rates to utilize in view of seed suitability.

3) SRI (System of Rice Intensification)

Expanding urbanization, a developing innovative working class, a quickly developing the travel industry area, and an expansion in ladies working external the house is supporting interest for rice. While rice utilization is on the expansion in Ghana, the country as of now is only around 30% independent in rice creation. The nation is creating simply around 150,000MT contrasted with an ongoing utilization necessity of around 700,000MT.

This method is developed in MADAGASKAR in 1980s and tested in China, Bangladesh, Indonesia, Colombia, Srilanka and Thailand.

Merits over conventional method:

- Water requirement only 50%
- Low seed rate(5kg/ha) number of tillers (10-150)
- More number of grains per panicle
- More grain/ test weight
- Use of fertilizer, native microorganism (IMO), chemicals from innovation cultivating, arbuscular mycorrhizal growths (AMF), and powerful microorganisms have been utilized as soil enhancer.
- Early harvest by 10-15 days
- Yield 1.5-2.0 times higher seed rate 5kg/ha

Nursery: Seeds are sprouted after seed treatments like using 3%brine solution, Thirum

Field preparation: Prepare field as for low land rice cultivation. Draw lines both ways at a spacing 25-25cm or 30-3-cm and mark the intersecting points for planting.

Transplanting: Place single seedling at 25-25cm or 30-30cm intersecting points marked with marker.

Fertilizer: FYM 5 tons/ha or 3 tons/ha green manure in the soils at the time of puddling.

First dose 3-4 days after transplanting, 2 urea DAP briquettes(37:17NP) should be planted in soil at 7cm depth in the centre of transplanting square.

Second dose, if necessary, should be applied the N after 15-20 days.

Water management: Regular water application, no stagnation, no flooding during vegetative phase. Intermittent wetting and drying. During grain filling 1-3 cm water level in the field.

Weed management: Weed infestation is severe in this method. Hoeing with rotary weeder is effective in controlling the weeds. First hoeing should be done in 10 days after transplanting. About four hoeing are necessary till panicle initiation. Weeds near the plant should be removed with hand weeding. Working with rotary weeder in Each direction reduces the expenditure on hand weeding. After weeding weeds should be buried in the soil. This adds organic matter to the soil.

Harvesting and Technology:

Harvest Time: When grains on lower part of panicle are in dough stage (moisture 18-22%).

Lowland rice 28-34 days after heading in dry season and 34-38 after heading in hot season.

Harvesting method: Harvesting by manual labour with sickle, dried by 2-3 days and then threshing.

Yield: Mid late duration varieties: 60-70 q/ha.

Grain yield for short duration varieties: 45-55 q/ha.

4) Direct seeding or broadcasting of sprouted seeds

PLANTING: The sprouted seeds with radicle length of 1-2 mm are broadcasted of the puddled field@100 kg/h to save labor.

Manures and Fertilizers:

- FYM or compost 10-15 tons/ha at 4-6 weeks before sowing.
- Application of 25:25:25 NPK/ha for local varieties and 100:50:50 NPK/ha for high yielding varieties.
- 50% N at planting.
- 25% N at acute tillering or 25-30 DAS.
- 25% N at panicle initiation or 55-65 DAS.

Micronutrients: Zn deficiency: Apply ZnSO4@ 25kg/ha in soil at puddling.

Fe deficiency: Apply foliar spray of FeSO4@ 0.5%

Boron deficiency: Apply 0.2% borax with lime on foliage.

Biofertilizers: Azolla, Anabaena azolla leaves, application of BGA.

Azospirillum, Azotobacter, fix 15-25 kg/ha N.

Water requirement: Total water requirement 1240mm or 10mm/day.

This method is practiced in the areas where there is shortage of laborers or labor wages are high. The land is prepared and puddled in the same manner as that for transplanting. The seeds are soaked in water and pregerminated.

3. Conclusion

Rice can be considered as a primary type of pay as well as a principle wellspring of food, particularly for low pay workers and nations impacted by neediness. The Governments ought to help the rice producers in any structure to safeguard them from cataclysmic events or some other structure to assist them with remaining above water in this aggressive and eccentric climate. SRI is a most suitable method of rice cultivation for poor farmers and it is a holistic Agro-ecological crop management technique.

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