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RESEARCH ARTICLE

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## PRODUCTION OF FLOOD TOLERANT RICE UNDER LOWLAND SITUATION IN ASSAM

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### ABSTRACT

Ranjit Sub-1 is one of the most promising winter rice variety of Assam. It is mainly grown in the flood affected areas of Assam. Mandira is located in South Kamrup area of Assam; where more than 80% area is flood affected. Hence, flood tolerant rice variety has a scope to grow in this flood prone areas of South Kamrup in Assam. All land in this places are not plain. As per the land classifications of Assam soil; it falls under the category of Low land. So, the input management was followed as per the POP of Assam Agricultural University at ZLRS, Mandira, Kamrup Assam. Number of rainy days were 65, 70 & 72 respectively during the crop growing season of 2022, 2023 & 2024

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## INTRODUCTION

Rice is the most important crop of Assam; occupying 2.5 million hectares of land, out of the total cropped area of 4.16 million hectare and contributing 96% of the total food grain production of the state, Assam. Assam is having six diversified Agro-Climatic Zones. But the number of rainy days and intensity of rainfall differ from each other. That is why chances of growing flood tolerant rice varieties are very much specific. South-Kamrup areas under the Kamrup district of Assam are facing chronic flood problem in each year. So, farmers are collecting flood tolerant rice varieties viz-Swarna-Sub-1, Ranjit-Sub-1 and Bahadur-Sub-1 in some special occasions to grow it in the flood prone areas more or less in every year. Some of the special characteristics of flood tolerant varieties are shown below:-

Ranjit-Sub-1, a flood tolerant rice variety; with the duration of 145-155 days. It is a medium slender type grain with a plant height of 115 cm and a yield of 5.0 to 5.5 t/ha. It can survive submergence for a period of 10-20 days. Land type is Lowland. In Assam more than 70% rice area is found under HYV. The total area under rice cultivation period of May/June-July/August due to which Sali rice (winter rice) is suffering badly from this stagnant water. Many farmers utilizing their land for Summer rice in lieu of winter rice (Sali rice). Ranjit-Sub-1/Bahadur-Sub-1 are the promising rice

varieties; showing submergence tolerance up to 15 days comfortably (without any harmful effect on rice yield). The average yield data of the demonstrated variety (cv-Ranjit-Sub-1) was taken just before the harvest of winter rice. Yield and submergence data are reflected in Table-1. Rainfall characteristics of the experimental site is shown in Table-2:

## MATERIALS AND METHOD

Certified/Foundation seed of any rice variety is giving good and quality type yield under any field condition. If Foundation seed is procured by any farmers then he can utilize that variety of seed in farmers field for at least 2-3 seasons. Foundation/Certified seed should be from a reliable source. A few steps are required to maintain for getting quality type seeds for the next season. Also, may be sold in the market at higher price. A good quality seed giving field germination of more than 90%. It is very much clean having no any inert materials, weed seeds etc. Genetic purity is more than 98%; which shows healthy, vigour and no any cracks in the seed material.

**Seed treatment:** The cleaned seeds of selected variety must be kept in water for 12-24 hours before the fungicidal treatment. Seed treatment helps in preventing from any other seed borne

Name of Variety	Days to maturity	Grain type.	Plant height(cm)	Grain yield(q/ha)	Special characteristics
Swarna-Sub-1	140-145	Medium bold	100	50-60	Suitable for growing in Low Land- Eco system of Assam. Submergence tolerance upto two weeks.
Ranjit-Sub-1	150-155	Medium slender	115	50-55	-Do-
Bahadur-Sub-1	150-155	Medium bold	115	50-60	-Do-

**Table 1. Performance of Ranjit-Sub-1 at ZLRS, Mandira**

Name of Variety	Year	Yield(q/ha)	Submergence (Days)	Durations(Days)	Effective tillers/m <sup>2</sup>
Ranjit-Sub-1	2022	58.50	10	153	289
Ranjit-Sub-1	2023	57.00	16	157	281
Ranjit-Sub-1	2024	56.15	20	158	278

**Table 2. Rainfall characteristics during kharif season at ZLRS, Mandira**

Annual Rainfall(mm)	Normal Rainfall(mm)	Actual Rainfall(mm)		
-	-	2022	2023	2024
-	2412.50(Yearly)	2465.00	2480	2508.00
May	652.00	865.45	758.00	768.00
June	578.00	754.15	698.50	715.00
July	515.00	725.10	648.80	685.00
August	505.00	718.45	498.00	415.00
September	465.00	695.00	514.00	432.00
October	412.00	609.00	508.00	411.00
No.of of rainy days in Kharif Season.	85	65	70	72

diseases. Seed treatment is used to avoid damping off, wilt and root rot disease in the seedling stage. It improves germination%, Vigour and productivity. Seed treatment is recommended by using fungicides, such as Carboxin@2.5g/kg of seeds. Alternatively, seed treatment can also be done using biocontrol agent *Trichoderma spp*@10g/kg of seeds. For this purpose; first soak the seeds in water for 12 hours than decant water and mix with the biocontrol agent and store as heap; covered with moist gunny bags for at least 12 to 24hours before sowing in the nursery bed.

**Nursery Bed Size:** For one hectare of area in the main-field, Nursery seed bed size should vary between 750 to 1000m<sup>2</sup> area but should not be more than 1/10<sup>th</sup> of the main field size. Land is thoroughly puddled and seed beds of 10m length, 15 cm height and 1.5m breadth are prepared keeping a 60 cm gap in between two beds. The length of the Nursery bed may vary according to convenience and availability of space.

**Time of Sowing:** Last week of May to first week of June is the most appropriate time for sowing sprouted rice seeds of Ranjit-Sub-1 in the nursery bed.

**Irrigation:** Irrigate to saturated condition in the surface soil of seed beds by maintaining 2-3 cm depth of irrigation water for raising rice seedling but little bit dryness is required for pulling rice seedling from the nursery bed at least 2-3 days prior to uprooting.

**Plant protection:** Adopt plant protection measures in the nursery bed as per the standard package of practice released by AAU for the state of Assam.

**Fertilizer Application:** About 3KgN, 1KgP<sub>2</sub>O<sub>5</sub> and 2Kg K<sub>2</sub>O +1 tonne of dry FYM are applied in the nursery bed just before sowing the sprouted seeds in the nursery bed area(45Kg sprouted seeds; sown for one hectare of land).

## RESULTS AND DISCUSSION

A fertilizer dose of 60-30-30Kg/ha N, P<sub>2</sub>O<sub>5</sub> &K<sub>2</sub>O has been recommended for winter rice in case of medium land and Lowland situation in Assam. 1/3<sup>rd</sup> parts of Urea together with full dose of Single Super Phosphate and Muriate of potash are applied in the main field at the time of final land preparation.

Remaining half dose of Nitrogenous fertilizer(Urea) is again divided into two halves.1/3<sup>rd</sup> of Urea is applied at panicle initiation stage of rice crop as top dressing and remaining 1/3<sup>rd</sup> part is applied at the time of flowering stage of rice crop as top dressing. Highest yield was recorded in 2022 followed by the year2023 & 2024. This is because of land submergence; which was more in 2024 compared to 2022 & 2023(Table-1). The harvesting period of winter rice(Sali) generally falls within November to December in each calendar year. The crop at maturity stage turn yellowing in colour. Most of the winter rice crop maturing within 150-165 days in Assam (Seed to Seed). Harvesting was followed by threshing and cleaning operations in time. In 2022, the duration was 153 days(seed to seed) but the duration was more in 2024(Table-1). Highest yield of 58.50q/ha was also recorded during the year of 2022.This is because of lesser water stagnation period; resulting in development of grain formation on panicle timely. As a result; the yield is becoming lower compared to normal yield of this flood tolerant variety. The rainy days was 65 days only in 2022(Table-2) but it was more in 2024(72 days). Yearly; rainfall was also more in 2024; causing poor grain setting. As a result more time was required to mature in the field condition.

## CONCLUSION

A flood tolerant rice can boost yields and profits for farmers in areas prone to flooding. To mitigate climate-induced production losses, various stress tolerant rice varieties have been developed and adopted in many countries. At least 8% yield could be enhanced if flood affected farmers can grow this variety in his crop field. Generally, local variety of Winter rice was found more susceptible under this stress condition. Therefore, we suggest for implementing location –specific policies and new technology for adoption of Ranjit Sub-1 as flood tolerant variety in South Kamrup area of Assam. Almost 30% of paddy area is prone to flash flood in India,with an average yield of 0.8 to 1.0t/ha in winter rice. Similar results were also obtained by Bhowmick *et al*(2014).

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