

জিঙ্কসমৃদ্ধ 'ব্রি ধান ১০০' নামে নতুন জাত উদ্ভাবন

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খনিজ উপাদান জিঙ্কের অভাবে ডায়রিয়া ও অ্যালার্জির মতো রোগ দেখা দিতে পারে মানবদেহে। তবে জিঙ্কসমৃদ্ধ জাতের ভাত খেলে শরীরে জিঙ্কের প্রয়োজনীয় চাহিদা মিটে যাবে। সেই চাহিদা মেটাতে এবার উচ্চমাত্রার জিঙ্কসমৃদ্ধ একটি নতুন ধানের জাত উদ্ভাবন করেছেন বাংলাদেশ ধান গবেষণা ইনস্টিটিউটের বিজ্ঞানীরা। নতুন এ জাতের ধানের নাম দেওয়া হয়েছে 'ব্রি ধান ১০০'। গবেষকরা বলছেন, বাংলাদেশের প্রায় ৪৪ দশমিক ৬ ভাগ শিশু এবং ৫৭ দশমিক ৩ ভাগ প্রাপ্তবয়স্ক নারী জিঙ্কের অভাবজনিত রোগে ভুগছে। এ জাতের ভাত খেলে জিঙ্কের অভাবজনিত রোগ কমে যাবে।

নতুন এ জাতের ধান এরই মধ্যে অবমুক্ত করা হয়েছে। কৃষি মন্ত্রণালয়ের বীজসংক্রান্ত কারিগরি কমিটির সুপারিশের পর জাতীয় বীজ বোর্ডের সভায় মঙ্গলবার চূড়ান্তভাবে অনুমোদন দেওয়া হয়েছে। ব্রি জানায়, এর আগেও পাঁচটি জিঙ্কসমৃদ্ধ জাত উদ্ভাবন করেছে ধান গবেষণা ইনস্টিটিউট।

এ ধানের চাষাবাদ পদ্ধতি সম্পর্কে মহাপরিচালক ড. মো. শাহজাহান কবীর বলেন, ১৫ থেকে ৩০ নভেম্বরের মধ্যে বীজ বপন করে ৩৫-৪০ দিনের চারা গাছপ্রতি ২-৩টি করে ২০ সেমি. - ১৫ সেমি. স্পেসিং দিয়ে রোপণ করতে হবে। মাঝারি উঁচু থেকে উঁচু জমি এ ধান চাষের জন্য উপযুক্ত। সালফারের অভাব পরিলক্ষিত হলে জিপসাম ইউরিয়ার মতো উপুরি প্রয়োগ করতে হবে। ব্রি ধান ১০০-এ রোগবলাই ও পোকামাকড়ের আক্রমণ প্রচলিত জাতের চেয়ে অনেক কম হয়। তবে রোগবলাই ও পোকামাকড়ের আক্রমণ দেখা দিলে বলাইনাশক প্রয়োগ করা উচিত।

ব্রি ধান ১০০-এর গড় ফলন হেক্টরপ্রতি ৭ দশমিক ৭ টন। উপযুক্ত পরিচর্যা পেলে অনুকূল পরিবেশে হেক্টরপ্রতি ৮ দশমিক ৮ টন পর্যন্ত ফলন দিতে সক্ষম। নতুন এ জাতের বীজ উৎপাদন করে বাংলাদেশ ধান গবেষণা ইনস্টিটিউটের কৌলিসম্পদ ও বীজ বিভাগ, আঞ্চলিক কার্যালয়গুলো এবং বিদ্যমান সিড নেটওয়ার্কের মাধ্যমে বীজ বিতরণ করা হবে।



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Cropping System Intensification in Coastal Region

Among different agro-ecological zones of Bangladesh, the coastal region is the most fragile and least productive because of soil and water salinity, water logging, storm surges, cyclones, etc. This area comprises 32 % of the net cultivable land of Bangladesh, but almost 1.1 Mha of that cultivable land is compromised by different levels of soil salinity. Topographically, the coastal area has an elevation 2-3 metres above the sea level and is connected with many rivers and canals; thus, tidal flooding through these rivers and creeks inundates the vast agricultural land and increases salinity in the soil, particularly during the dry season. Agriculture, therefore, in the coastal zone of Bangladesh is threatened by a range of abiotic stresses, including soil and water salinity, water logging, and drought due to crop water unavailability for high salinity in the soil. In addition, in this area, the predominant clay minerals of soil are smectite and mica, and drying of these soils creates shrinkage and vertical cracking, which limits dry-season non-rice cultivation. Rice is generally grown in this region in the wet (Kharif) season, but the land remains fallow in the dry (rabi) season. Recent studies have shown that there is 700,000-800,000 ha of land underutilized during the dry season in Southern Bangladesh. The government has now given more emphasis on exploiting every possible opportunity in this salt-affected low-lying area to maintain increasing food demand and to have food self-sufficiency for the growing population.

There is a great potentiality to increase the cropping system in this region if crops can be established in a timely manner to allow for the better use of residual soil water after the monsoon season, together with a couple of supplementary irrigation. Achieving this requires the cultivation of short duration high yielding Aman rice varieties that mature early, and drainage of excess water shortly prior to Aman rice harvest. Zero/No-tillage and reduced tillage technologies could be applied to enable the early establishment of rabi crops (i.e., dry season crops) into the moist soil as soon as possible after the Aman rice harvest. Moreover, the use of straw mulch could help to conserve soil moisture, reduce salt accumulation on the surface and ameliorate soil physical constraints. The possible options for crop intensification are discussed below:

Conserving freshwater for irrigation

One of the main constraints for dry-season crop establishment in the coastal area is freshwater scarcity. River water salinity is < 1 deciSiemens per metre during the monsoon (June-November), but during the dry season, salinity starts to increase from December and reaches the peak in April-May (> 20 deciSiemens per metre). The high salinity of water during

irrigation in this area as monsoon rainfall is over 1,500 millimetres and natural reservoirs are capable of storing this water. The less saline river water stored in the internal canal network in the last week of December could be profitably used for irrigating dry season crops. A mini pond covering 3-5 % of farmland surface area can be used to store run-off or flood water during monsoon for irri-

impedes normal crop cultivation. Surface water stagnation in saline soil reduces aeration around the crop root zone, decreases nutrient availability, and increases the movement of sodium (Na⁺) to plant leaves, resulting in lower crop yields. One effective and simple way to remove excess water from agricultural land is surface drainage. Also, land grading to flatten the soil surface and achieve a shallow slope can eliminate surplus water from the field. For clay-textured soil, a V-shaped open field ditch (30-45 cm deep) can drain field water very quickly after heavy rainfall. A recent study has shown that surface drainage (open ditches: 15-20 cm deep and 20-25 cm wide) installed after harvesting Aman rice facilitated the early establishment of non-rice crops. It became functional the day after the heavy rainfall event. It was found very useful as a means of tillage operation for timely crop establishment and averting the failure of early sown crops from water logging.

Crop establishment method

In the coastal zone, non-rice crop establishment is challenging because crops are often damaged by salinity and drought due to lack of freshwater irrigation and water logging by post and pre-monsoon rain. The dilemma is that early rabi crop establishment can be delayed by excess soil moisture after harvesting of Aman rice, which limits timely soil preparation, while the delay in seed sowing exposes the crop to soil dryness, salinity, and possibly heat stress later in their growth. Therefore, for early sowing between mid-November to mid-December, zero tillage dibbling of seed into wet soils could be a reliable crop establishment. With this establishment, the crop can utilize maximum soil residual moisture and avoid salinity risk in the later part of the growing season as well as water logging due to pre-monsoon rain. However, the study showed that mechanized zero tillage on wet-clay soil is less effective than reduced tillage like bed planting and single-pass shallow tillage because zero tillage causes soil surface dryness, soil compaction and increasing soil salinity, thereby decreased yield. For the mechanized establishment of dry season crop, reduced tillage (bed planting or single-pass shallow tillage) would be the best practice for increasing soil water availability, reducing soil salinity, and increasing crop yield. **Page 7 Col 7**



In the coastal zone, cropping intensity and productivity is much lower than the country average. The misperception is that dry season crop establishment in this area is impossible due to poor drainage and soil salinity. However, there is a possibility to greatly increase cropping system productivity using improved agronomic practices

the dry season restricts water availability for plants and reduces the final yield. In the polder area of Southern Bangladesh, there are many internal canals and creeks connected with the river. For example, in polder 30 and 31 in Khulna district, there are approximately 136 and 190 km active canal, which can be used for rainwater harvesting or freshwater storage before river water salinity goes above the permissible limit. There is a good prospect to harvest rainwater for

gating dry season crops that are crucial for increasing yield. Irrigation in the dry season can contribute to the removal of soluble salts from the crop root zone by leaching, which can help for the reclamation of agricultural land and for increasing the cropping area.

Surface drainage

In the salt-affected coastal region, drainage congestion due to low-lying land, shallow groundwater, intense rainfall events, and poorly structured soil

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Using rice straw mulch

In southern Bangladesh, the common problems for dry-season crop cultivation in the clay-textured saline soil are soil compactness and surface dryness, increased soil salinity, and cracking. In many parts of the world, mulching is being practised to conserve soil moisture, increase water use efficiency, mitigate soil salinity and soil physical constraints and boost crop yields. Rice straw is a biodegradable organic material suitable for use as mulch in many climatic conditions. A recent study in this area reported that rice straw mulch application on the soil surface (~ 5 ton per hectare) significantly improved sunflower growth and yield by improving soil water storage and diminishing soil salinity, soil compactness, and cracking. However, the adoption of straw mulch technology for crop and soil management in this area depends on mulching material availability because straw mulch has values for animal fodder, fuel, and domestic purposes.

Crop cultivars

The selection of crop species is a crucial consideration in saline agriculture. Some crop cultivars have a more remarkable ability to withstand the effects of root zone salinity and water stress within most species. For cropping system intensification, the desirable characteristics of selecting salt-tolerant cultivars should be (i) high economic value, (ii) tolerance to salinity, (iii) ability to tolerate saline irrigation water, and (iv) a good fit in the crop rotation.

Crop responses to salinity differ widely from highly tolerant to extremely sensitive. For example, barley and cotton are considered highly salt-tolerant crop species, while wheat, maize and sunflower are considered moderately salt-tolerant. Recently, sunflower in the south-west coastal region of Bangladesh has been considered a promising crop as a source of edible oil with high polyunsaturated fatty acid content (about 90% linoleic and oleic acids). It has moderate drought tolerance with the potentiality to use soil water more efficiently because of its deep branched root system. Sunflower is also an eco-friendly and diversified crop as it needs a small quantity of irrigation water (~ 50 mm), small amounts of pesticide and insecticide, and it can be grown with minimum soil disturbance and with other cereal crops in inter-cropping systems. Recent studies in the south-west coastal region of Bangladesh demonstrated that potato, maize, barley, wheat, and sunflower established by zero tillage after Aman rice have the potential to increasing cropping intensification.

To sum up, in the coastal zone, cropping intensity and productivity is much lower than the country average. The misperception is that dry season crop establishment in this area is impossible due to poor drainage and soil salinity. However, there is a possibility to greatly increase cropping system productivity using improved agronomic practices such as drainage, adjusting sowing time, zero and reduced tillage and mulching. There are essential government supports and social involvement to implement better soil and crop management considering these technologies for cropping system intensification in the coastal region.

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