Editorial

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Importance of dry seeding in rice production

Editorial

Worldwide, 738.2million tons of rice (*Oryza sativa L.*) is produced from about 160.9 million hectares of land, about 90% of production comes from the Asian countries. Rice provides 30-75% of the total calories to more than 3billion Asians. Globally rice demand is increasing and to meet up this demand, about 114million tons of additional milled rice needs to be produced by 2035. In Bangladesh, rice contributes about 95% of the food grains consumed in the country. At present, the requirement of rice in the country is 33.0 million tons which needs to be increased to 55.0 million tons by 2050 to meet up the food demand of the increased population. The possibility of expanding the area under rice in the near future is limited. Therefore, this extra rice production needed has to come from an increased productivity.

There are three rice growing seasons viz. *Aus, Aman* and *Boro* in Bangladesh. The contributions of *Boro, Aman* and *Aus* rice to the total production of 33.91million tons are 55.38% 37.74% and 6.88%, respectively. Aus and Aman rice are mostly grown under rainfed condition with no or little supplemental irrigation as the crop received huge water from rainfall. On the other hand, rainfall is scanty in boro season and therefore, rice production in this season is fully dependent on irrigation sourced from surface and underground water. Rice is mostly cultivated by transplanting of seedling on puddled land and conventionally, continuous standing water is kept in the field to facilitate easy weed control and crop establishment. The water requirement for rice production in Boro season under puddled transplanted system in Bangladesh is about 1500-2000mm. Thus, a huge quantity of water is required for boro rice production. However, at present, the sustainability of rice production during boro season is at stake as irrigation water shortage is looming.

Dry seeding is an alternative crop establishment method which facilitates successful rice production using 50-70% less irrigation water compared with the total irrigation water required in the puddled transplanted system. Trials at farmers field at different locations in Bangladesh reveals that the yield of rice is higher in dry seeded crop than the puddled transplanted ones. In this system, primed rice seed is sown at 25cmx15cm at 5cm depth in the dry cultivated land allocating 4-5 seeds hill^{-1}. Priming is done by soaking seed in water for 24-30 hrs followed by incubation for 24-30hrs until radicle reaches about to sprout. Seed can also be sown in line at 25 or 20cm apart rows continuously using 50-60kg seed ha^{-1} but the yield at continuous row seeding is about 5% lower than the spaced seeding. Osmopriming of seed using 3% $ZnSO_4$ solution and seed treatment by *Trichoderma harzanium* inoculum could improve seedling establishment and yield. The fertilizer management and other cultural operations are similar in dry seeded rice like transplanted one. However, alternate wetting and drying approach of irrigation water management is followed in the dry seeded crop from seedling stage until panicle initiation after that 3-5cm standing water is maintained up to heading stage. Weed infestation is higher in dry seeded rice but integrated weed management approach combining herbicides and cultural practices could help easy and economic weed control. Seeding is generally done using residual soil moisture but light irrigation may be required if sufficient moisture is not present in the soil.

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Dry seeding offers potential water saving by eliminating puddling, continuous ponding, reducing evaporation loss and irrigation frequency. Dry seeded system avoids puddling, this operation requires about 20-40% of the total water required for growing rice. The adoption of alternate wetting and drying technique also helps reducing water application by 25% compared with continuous flood irrigation technique. Dry seeding requires lower number of irrigation as puddled soil is more prone to cracking, which can lead to large deep drainage losses upon reflooding. The puddled transplanted field is kept ponded for first 15days after transplanting which is lacking in dry seeded crop.

Dry seeded crop requires substantial amount of lower cost but gives higher return. The cost of production in dry seeding is lowered due to saving of labour cost for seedling raising, uprooting and transplanting as well as from lowering the cost for irrigation water. Dry seeding saves about 40% irrigation cost and about 35% labour cost for seedling raising and transplanting. A number of reports show that dry seeding increases cost for weeding but judicious weed management approach substantially reduces the cost. It is important to note that the reduction of worker is necessary for rice production at the face of recent labour shortage and increased wages. This problem can easily be resolved by switching to dry seeding from the conventional puddled transplanting system especially in the tropical and subtropical regions.

Wheat or many other up-land crops are grown after rice in different areas of Bangladesh. Rice is grown by transplanting on puddled soil while wheat is cultivated after pulverizing the soil. Puddling destroys soil structure and adversely affects soil productivity. The deleterious effects of puddling on soil environment are reflected mostly found in the wheat crop.

Anthropogenic activities contribute to global warming by emitting carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Agriculture shares about 60%, 34% and 1% emission of N_2O, CH_4 and CO_2, respectively with major rice based cropping systems. It has been reported that dry seeding reduces 24-79% CH_4 emission compared with puddle transplanted continuous flooded rice production system. Sometimes, dry condition encourages N_2O emission but judicious water management in dry seeded system can reduce emission of CH_4 and N_2O to a greater extent.?

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Dry direct seeding has therefore, huge potential in yield improvement of rice using minimal water and labour. Besides, this system has positive impact on soil and environment. Thus, the dry seeding system should be adopted for greater benefit of the farming community as well as for saving on highly precious water resources and reducing the emission of green house gasses. The barriers of the adoption of this potential technology need to be explored for ensuring food security of the ever increasing world population and also to reduce global warming under the brisk of the upcoming climate change condition.

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Conflict of interest

The author declares no conflict of interest.