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Need of Creating Awareness for Promoting DSR Cropping System in the Light of Climate Change

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Abstract—*Production of conventional puddled transplanted rice is facing severe constraints because of water and labour scarcity and climate changes. The rice cultivation experiences the challenge of GHG emission, particular in developing countries, and at the same time highly vulnerable to extreme climate variability. GHG mitigation in the environment conservation as well as the adaptation measures to safeguard food production and food security is imperative. Short term adaptation measures for food production could focus on shifting seasons and sowing dates, different varieties of species of crops, water supply and irrigation, fertilizers and tillage methods. As an integrated approach towards mitigation and adaptation of climate change, it is important to have a holistic natural resource management which helps to buffer the impact of climate conditions and enhance the capacity of natural carbon sinks. Looking at the potential of DSR, scientists through knowledge interventions are concentrating in developing suitable varieties and agronomic packages for promoting the DSR. In view of this the present paper aims to highlight the need for awareness on advantages of DSR cropping system for its wider adoptability by farming community.*

Keywords: *Direct Seeded Rice Production, Awareness, Climate Change*

1. INTRODUCTION

Rice is the most important staple foods for more than half of the world's population(IRRI,2006)1.It influences the livelihoods and food security of several billion people.In2010, approximately 154 million ha were harvested worldwide, of which 137 million ha (88 percent of the global rice harvested)were in Asia- of which 48 million ha(31 percent of the global rice harvested)were harvested in Southeast Asia alone (FAOSTAT,2012)[2].More than 90% of this is produced and consumed in Asia with two countries, China and India, growing more than half the total crop, providing 50% of the total calorie intake of Asia's population. Irrigated rice systems account for 78%of all rice population but only 55% of the total harvested rice area is concentrated on alluvial food plains, terraces, inland valleys, and details in the humid and sub-humid subtropics and humid tropics of Asia.

The rice has been grown in South Asia for more than 6000 years. In earlier days, farmers of many parts of the world commonly followed the practise of broadcasting rice seeds directly on dry or puddled soils, drilling of seeds in moist soils behind country plough or manual seeding. However, there was rapid switch over from traditional direct seeding to transplanting of rice on to puddled bed ensuring optimum plant stand, good water retention and less weed problem owing to the availability of high yielding, fertilizer responsive and lodging resistant dwarf rice varieties, expansion of irrigation infrastructure and attractive incentives provided from the Governmentto produce more food grains. Presently, the transplanting system of rice is more commonly practiced in the irrigated areas whereas dry seeding is extensively practiced in rain fed lowlands, uplands and flood-prone areas in India (Rao *et al*., 2007)[3].

2. MAJOR CHALLENGES IN RICE PRODUCTION

Presently, rice production is facing major challenges like high water demand; unfavourable weather and drought. Around 95%of the rice area under modern varieties is irrigated, and requires about 1200 mm to 2500 mm of water depending on soil texture, structure and profile conditions (Reddy, 1995).[4]Unfavourable weather conditions and drought can cause water related stress in rice production. Transplanting of rice is more water demanding, laborious, cumbersome, time consuming and entails a lot of expenditure on raising nursery, uprooting and transplanting. Scarcity of labour during peak period of transplanting, uncertain supply of irrigation water, depletion of groundwater and increasing production cost necessitate the search for an alternative to the conventional puddled transplanting of rice.

The challenge is to integrate productivity and profitability improvement while conserving and enhancing the quality of the environment on which production depends. Excessive pumping of water for puddling in peak summers in North West

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Indo-gangetic plains (IGP) causes problems of declining water table and poor quality for irrigation on one hand. It is known fact that, rice field releases methane into the environment that contributes to global warming. Emissions from flooded fields are higher than those from drained fields (Pathak, *et al*.2013)[5].

3. DIRECT SEEDED RICE (DSR)

Direct seeded rice, a common practice before green revolution in India, is becoming popular once again because of its potential to save water and labour (Gupta *et al*, 2006)[6].Currently, DSR in Asia occupies about 29 Mha which is approximately 21% of the total rice area in the region (Pandey and Velasco, 2002)[7]. Countries like USA and Australia extensively practising direct seeding of rice are with profitable results as it avoids all the penalties entailed in transplanting. DSR under no/reduced tillage is an efficient resource conserving technology holding good promise in coming days because of reduced labour requirement, water saving, fertilizer use efficiency, early maturity, energy saving and reduction in methane emission.

4. CREATING AWARENESS FOR PROMOTING DSR

DSR or Direct-seeding of rice has the potential to provide several benefits to farmers and the environment over conventional practices of puddling and transplanting.Farmers have perfected puddling and transplanting over time and are reluctant to try alternatives. There is a dire need for awareness for promoting DSR and to change the traditional mind set of farmers.

The economics play an important role in the decision making of farmers. Trials that are largely conducted by researchers clearly show economic advantages in DSR over puddled [8]transplanting. A major reason for farmers' interest in DSR is the rising cost of cultivation and decreasing profits with conventional practice. Farmers likely prefer a technology that gives higher profit despite similar or slightly lower yield. Overall analysis of 77 published studies shows that various methods of direct seeding reduced the cost of production by US$9– 125 per ha as compared with conventional practice (Kumar and Ladha, 2011)[9]. The largest reductions in cost occurred in practices in which reduced or zero tillage was combined with Dry-DSR. These cost reductions were largely due to either reduced labour cost or tillage cost or both under

As a nation with the considerably large per capita ecological footprint and natural resource dependent society, India is also facing increased pressures linked to global climate change. While climate change and livelihood is frequently contested at the national level, the discourse still primarily focuses on preservation and restoration rather than the preventive paradigm of sustainable development. Mostly there is the lack of dissemination of pertinent information from one end to another which makes it difficult to capture the real time information of changes in progress. Mass awareness needs to be created about the introduction of soil and rice health management and knowledge dissemination about the impact of climate change on agriculture resulting in more social awareness and expected changes in rice cultivation. The DSR cultivation process is highly recommended and implemented through multiple stakeholders who are not only critical in the agrarian ecosystem but also have interest in the betterment of the farming community in terms of soil and plant health, water management and adaptation of DSR techniqueThe national organizations despite of having some mega programmes, have limited reach and miss upon the available human capital to act as available line of help to the farmers. To develop preparedness and effective management skills, a strong awareness campaign followed by strengthening the capacity of local organizations to manage resilience is critical to effectively pursuing sustainable development under conditions of climate change.

5. PERSPECTIVES

DSR is a labour saving technology which enables farmers to diversify labour allocation by releasing labour from agricultural activities. To the extent that non-agricultural income activities are less climate-sensitive than the farm activities, further diversification of incomes out of agriculture could be a promising strategy to prepare farmers for climate change. The water required by DSR is much lesser than transplanted rice, preparing farmers for climate change which is expected to increase incidence of drought. Although some DSR benefits cannot be easily captured by economic parameters, farmers should be made aware of DSR benefits through extension services or public media. There is a great need for awareness and training of farmers on DSR and climate change so that they can prepare for climate change by increasing farming practise options and diversifying income sources, and need public support for this preparation.

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