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Studies on farmer's saved rice seed used by the hill farmers of Manipur

Th.T. Singh
Department of Botany, Ideal Girls' College, Akampat, Imphal East, Manipur,

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ABSTRACT

To study the farmer's saved rice seeds 250 seed samples were collected from the farmers of hill districts of Manipur. Farmers generally store their saved seeds in kotlus, gunny bag, bamboo mats, mud pastured stored structures even in tins and drums without any seed treatment These samples were subject to physical purity analysis, germination test and moisture content. Only 46.8 percent seed samples had 80 percent seed germination. Out of 250 seed samples 96 seed samples could meet the permissible seed moisture level. In the pure seed test only 6 samples could meet pure seed range 98 percent. The overall seed quality assessment in hill districts only one sample out of 250 samples could meet the Indian Seed Standard for certification with regard to different quality components. Thus, the farmers saved rice seed in Hill Districts of Manipur was very much substandard.

1. Introduction

Rice occupies about 35 percent of the total area under food grains and contributes around 41 percent to the total food grain production in the country (Agricultural Statistics at a Glance 2014). Rice is the major crop of the people of Manipur in term of area, production and consumption in the state.

Manipur, in the North-East region of India, lies between longitude 93.03° E to 94.78°E and Latitude 23.83° N to 25.68°N with a total geographical area of 22,327 sq.km. The land may be divided into two districts physiographical division – the hills comprising 90 percent of the geographical area with five revenue districts viz, Chandel, Churachandpur, Senapati, Tamenglong and Ukhrul and the valley occupying only 10 percent with four revenue districts Viz, Imphal East, Imphal West, Bishnupur and Thoubal. In the hill districts shifting cultivation (jhuming), terrace cultivation and contour cropping are practiced according to the nature of soil and physiographic (slope and gradient) of the farming area. The general duration of the jhum cycle usually takes 5-7 years. But, in the hill areas of Manipur especially in the south districts the duration of the jhum cycle is about 3-5 years only. About 3 lakhs tribal population in the age-old practice of jhuming. For every 5-member tribal family about one hectare of jhum land is required. Thus, they are extending their jhum land in the new virgin land. About 900 sq.km. of virgin forest is burnt down every jhum land (Laiba,1992). The total acreage under rice crop during 2011-2014 crop season is given in Table 1. The total rice production in the state for the year 2014 is 1.96 tonnes/ha, whereas valley districts produced 2.28 tonnes/ha and hill districts produce 1.58 tonnes/ha. The rice productivity is very low in hill districts in comparison to valley districts as well as national average. Availability of water is more uncertain for the upland rice crops as jhum cultivation is solely dependent on seasonal rainfall. Thus, possibility of crop failure is very high in the upland rice crops. Low productivity and crop failure will lead to greater pressure for extension of jhum land. One of the main reasons for low production in these farming systems may be the inferior quality of rice cultivars as well as rice seed used by the hill farmers. At the same time the tribal farmers are ignorant of the modern concept of scientific farming system. The present study attempts to study the quality status of farmers' rice saved seed in comparison with the recommended certification standards (GOI,1988).

Corresponding author: tilakigc2016@gmail.com

Table 1. Estimated area and production under rice by 2011-12 to 2013-14.

A= area in 000 ha. P= Production in 000 Mt. Y= Yield in MT/ha

Particulars	2011-12			2012-13			2013-14		
	A	P	Y	A	P	Y	A	P	Y
*National average	44006	105310	2.39	42753	105240	2.46	44136	106650	2.41
**Manipur Valley districts	106.08	389.94	3.67	52.34	148.36	2.83	106.18	393.25	3.70
**Manipur Hill districts	88.82	113.10	1.27	53.20	65.56	1.23	88.82	112.64	1.26

(Source: *Annual report 2016-17,Department of Agriculture, Cooperation & Farmers Welfare Ministry of Agriculture & Farmers Welfare Government of India Krishi Bhawan, New Delhi-110 001; ** District wise Area and Production 2011-14, Department of Agriculture, Govt. of Manipur)

2. Material and Methods

The rice seed samples were collected using area sampling technique (Kothari, 1990) during the sowing season of 2014 from five hill districts of Manipur. From each district 5 villages and from each village 10 farmers were randomly selected for seed sample collection. Thus, the total number of seed samples collected was 250. The samples were tested in laboratory for seed standards, viz., purity, germination and moisture content as per the ISTA seed testing rules (ISTA, 1985).

Purity test: For purity test 3 replicated 40g working samples were taken from each collected seed sample. Each working sample was separated into different components, viz., purity seed, other distinguishable varieties, other crop seeds, inert matter and total weed seeds. Each particle was judged individually, the criteria used being external appearance (shape, size, colour, gloss and surface texture) and appearance in transmitted light. All the results were expressed in terms of weight percentage except for total weed seeds which was expressed as the actual number of weed seeds.

Germination test: Four replicates 100 pure seed from each seed sample were placed with adequate spacing on moist substrates of two rolled towel papers. The seeds were loosely covered with another layer of rolled towel paper. The paper rolls were incubated at $27 \pm 1^{\circ}$C in a germinator keeping them upright positions. The seed germination (normal) rate were calculated as percentage on the 14^{th} day of incubation.

Moisture content: Four replicates of 10g seeds from each samples were taken for percent moisture content. The seeds were kept in weighting bottles and kept at 70°C for 2-5 hours. After the preheating each replicates were ground using a seed grinder. The seed powder was dried at 130°C for 2 hrs. and the moisture loss was calculated in terms of percentages.

The three results were classified into groups with respect to each quality attribute and compared with the Indian minimum standard (GOI, 1988). For each quality attribute data classification was based on the results, ranges and seed certification limit.

Several studies have demonstrated that phytochemicals including curcumin (Shehzad *et al.,* 2011), caffeic acid (Lee *et al.,* 2010), epicatechin (Bahia *et al.*, 2008), grape seed extract (Gessner *et al.,* 2013), cinnamaldehyde (Wondrak *et al.,* 2010) and anthocyanins (Hwang *et al.,* 2011) increased the expression or translocation of Nrf2 and reduced or inhibited the activation of NF-κB, suggesting that phytogenic compounds can protect against oxidative stress and reduce inflammation, and eventually lead to the improvement of animal health and growth performance (Yang *et al.,* 2015). Limonene, the main active substance of lemon oil was shown to reduce leukocytes and pro-inflammatory cytokines such as tumour necrosis factor α (TNF-a) after an induced acute inflammation (Kostas *et al.*, 2015). Feed Supple-mentation with essential oils from oregano, rosemary and thyme increased the antioxidant capacity in the jejunum and liver of piglets and that PFA can improve the defense against microbial and feed derived toxic substances (Aumiller *et al.,* 2017). Feeding the weaned piglets with caraway and lemon essential oils revealed an increase of the antioxidant enzymes glutathione peroxidase and superoxide dismutase and decreased lipid peroxidation in blood plasma when compared to an unsupplemented control feed (Kostas *et al.,* 2016).

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3. Conclusion

To have healthy animals performing at their best, phytogenics are likely to be a valuable alternative to antibiotic based growth promoters. The feedback of 758 agribusiness professionals surveyed within the framework of the Phytogenic Feed Additives Survey by Biomin indicated the antimicrobial effect, digestibility enhancement and growth promotion as their reasons for applying phytogenic feed additives to farm animal diets. As the feed costs of the grower-finisher phase account for up to 70% of the total production costs, improving feed digestibility and feed conversion ratio will increase profitability. Phytogenics can increase feed digestibility. Moreover, the antioxidant and anti-microbial properties of phytogenics support the animal to combat some common stressful situations. Some phytogenics have shown the ability to reduce ammonia formation Thus, the negative impact of ammonia emissions on the environment and the noxious effect on animals and workers can also be reduced. It is also imperative to work on screening and evaluation of the locally available spices, herbs and other plants having the potential to be use as feed additives in livestock production that benefit the farmers in producing healthy animals

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