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Influence of Rice Husk Ash on Controlling Insect Pests on Storage of Maize (*Zea maize* L.) Seeds under Manipur Condition

MS Singh

Abstract: ***An experiment was conducted in the Agronomy Department, College of Agriculture, Central Agricultural University, Imphal, in 2017-2018, to study the "Influence of rice husk ash on controlling insect pests on storage of maize seeds (Zea maize L.) under Manipur condition". It was observed that when we mixed the rice husk ash with maize seeds properly and stored in a polythene bags for one year at the rate of 400g rice husk ash and above per 1kg` maize seeds, there was no loss of maize seeds from the insect pests. But in control where no rice husk ash was mixed, after one year of storage, all the maize seeds were affected i.e. 100 percent, by the insect pests.***

Keywords: Maize seeds, rice husk ash, insect pests

1. Introduction

India is one of the top ten maize producers in the world. It contributes around 2-5% of the total maize produced globally and is one of the top 5 maize exporters in the world contributing almost 14% of the total maize exported to different countries around the world. South- East Asia is the biggest market for Indian maize with almost 80% of the exported Indian maize going to Indonesia, Vietnam and Malaysia (www.Kleffmann.com). Maize is the second cereal crop grown in the state of Manipur with a total area of 19,440 hectares and production of 2.29Mt per hectare. Maize is grown in all the hill and valley districts of Manipur. Stored grains are affected by insect pests seriously and damaged percentage is very high. Several synthetic pesticides were used, but they have shown adverse effects on environment and persist for longer period in form of residues and entered in the food chain after utilization of products of organisms (Prakash *et.al.*2016*)*. In Manipur, majority of the farmers are small and marginal farmers. So, storing of grains after their harvest has always been a problem for farmers as the stored grains are found to be often infested with insect pests. As a result small and marginal farmers who grow maize are unable to store their seeds at a lower price. Seeds kept for sowing for the next season are also infested and hence, cannot be used for sowing thereafter. Timely sowing of maize is also one of the factors for high yield of maize but sometime farmers could not effort it due to damage the maize seeds by insect pests as well as rodents which they kept stored. The insect pests directly feed on the stored grains and other stout beetles lay their eggs on stored grains. The larvae thus developed from the eggs bore and feed on the grains, thereby reducing the quality of the produce, if we do not use any synthetic or organic pesticides .Now-a-days, with the popularization of organic farming in the state of Manipur, farmers are willing to explore and adopt more organic solutions within their capability by utilizing of locally available materials in order to improve their income as well as to save the environment and human health. Hence to bring about a suitable storage method with eco-friendly and farmers friendly , an experiment was conducted at College of Agriculture, Department of Agronomy , Central Agricultural University, Imphal, from the year 2017 to 2018,"Influence of rice husk ash on controlling insect pests on storage of maize (*Zea maize* L.) seeds under Manipur condition".

2. Methodology

Well mature maize seeds were collected from the farmer fields and then were dried well under the sun for 5 days and then cooled them. Then stored them in polythene bags by mixing well with rice husk ash at different proportions as follows: - T_1(1kg of maize seeds – without rice husk ash as control), T_2(1kg maize seeds +200g of rice husk ash), T_3 (1kg maize seeds +300g of rice husk ash), T_4 (1kg maize seeds +400g of rice husk ash), T_5 (1kg maize seeds + 500g of rice husk ash), T_6 (1kg of maize seeds +600g of rice husk ash), T_7 (1kg of maize seeds +700g of rice husk ash) and T_8 (1kg of maize seeds +800g of rice husk ash), and then stored with the ends of bags tied. Each treatment consists of three replications. The upper most layer of each treatment was covered with a layer of rice husk ash, and was placed on a plank in the experimental room for a year. The stored maize seeds were monitored and damaged percentage was recorded for each consecutive year i.e. from 2017 to 2018.

3. Result and Discussion

It was found that there was no damage of maize seeds by insects pests in the treatment T_4 to T_8 i.e. when the maize seeds were mixed with the rice husk ash at the ratio as 1kg:400g, 1kg:500g,1kg:600g, 1kg:700g and 1kg:800g as shown in Table 1.

Table 1: Effect of rice husk ash on 1 year storage of maize seeds (2017-18)

Treatments	Damage percentage (%)	
	2017	2018
T_1 (1kg maize seeds – without rice husk ash as control)	100	100
T_2 (1kg maize seeds +200g of rice husk ash)	65	70
T_3 (1kg maize seeds +300g of rice husk ash)	35	38
T_4 (1kg maize seeds +400g of rice husk ash)	0	0
T_5 (1kg maize seeds + 500g of rice husk ash)	0	0
T_6 (1kg maize seeds +600g of rice husk ash)	0	0

T_7 (1kg maize seeds+700g of rice husk ash)	0	0
T_8 (1kg maize seeds +800g of rice husk ash)	0	0

It may be due to fact that rice husk ash which contains Iron oxide (Fe_2O_3 = 0.05%), Silicon Dioxide (SiO_2 = 96.7%), Aluminium Oxide (Al_2O_3 =1.01%), Calcium Oxide (CaO =0.49%), Potassium Oxide (K_2O = 0.91%) (Kartinic, 2011). Rice husk as interferes with insect feeding and also hinders fungal pathogen multiplication as well as affects the insect movement to search for making partners. Friction of the dust particles with the insect's cuticle leads to desiccation and hampers the developments of the pests (Rekha *et.al.* 2014). Similar result was also obtain by Singh and Devi (2019) that rice husk ash controls insect pests on storage of soybean and pea seeds, Singh(2020), black gram seeds. Dust, such as silica gel or diatomaceous earth can be combine with certain grains to provide protection against insect damage (Rajasri and Kavitha 2015). So the same result was found from T_5 to T_8 with T_4 it may be due to that in these treatments the maize seeds could be covered well with the rice husk ash evenly, as a result insect pests could not damage. In the similar way, Singh and Devi (2020), Singh(2020) observed that rice husk ash could control insect pests on storage of pea seeds and black gram seeds. In The treatments T_2 and T_3, in the first year i.e. 2017, the damage percentage of maize seeds were 65 and 35 respectively, and in the second year i.e. 2018 the damage percentage were 70 and 38 respectively which were comparatively less damage than treatment T_1 i.e. control without rice husk ash. It might be due to sparse coverage by rice husk ash which let the insect pests to develop in the possible space.

4. Conclusion

Maize seeds could be stored with rice husk ash at the ratio 1kg maize seeds/400g of rice husk ash and above to protect from the damage of insect pests for one year in Manipur condition. Hence it can replace synthetic insecticides safer eco-friendly and farmer friendly as well as increase the socio economics of the farmers of Manipur. Not only that farmers can show their maize crops at the right time for high yield as the seeds are present with them.

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Author Profile

MS Singh, College of Agriculture, Central Agricultural University Imphal, Manipur, India. Email-msumarjit@yahoo.com