Modern maize varieties are more weevil susceptible than local populations when stored in local manner in East Timor.

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Abstract

Most maize production in East Timor uses traditional maize populations. Maize is normally stored on the cob in the sheath, either hanging from a tree or above the kitchen. Although modern maize varieties yield more than the local populations, farmers are reluctant to change due to a perception that new varieties are more weevil susceptible.

Participatory research was conducted with 18 farmer groups across three regions (Loes, Maubara and Remexio). Local and introduced maize varieties, stored using a range of methods, were regularly examined for weevil infestation up to 33 weeks after harvest.

Storage of local maize populations using traditional methods experienced very little weevil damage (1.5% of seeds damaged), whereas the modern varieties stored in this manner suffered 40% loss due to weevil attack 30-33 weeks after harvesting. Although weevil attack in the modern maize was very severe when stored using traditional methods and all varieties, stored as threshed grain in in poly sacks, were severely infested by 15 weeks, there was no weevil damage when the maize was stored in sealed air-tight containers. There is therefore great potential to increase maize farming yield and sustainability through the combined used of modern varieties and air-tight storage systems.

Key Words

East Timor, maize, subsistence farming, weevil tolerance

Introduction

Maize is the dominant cereal crop in the upland areas of East Timor, with more than 80% of farmers growing some maize. Most maize production uses traditional populations, grown on steep hillsides by subsistence farming families. Average maize yields are estimated to be approximately 1.5 t/ha, which is barely enough to meet the calorie intake requirements of a farming family. In these areas, maize is normally stored on the cob in the sheath, either hanging from a tree or above a kitchen.

Modern higher yielding maize varieties such as Arjuna and Kalinga were introduced to East Timor over 20 years ago. These varieties have a yield potential of 6 t/ha and yield well above the local maize populations in variety evaluation trials. However, these varieties have been poorly adopted by most maize farmers in East Timor (Ceniceros et al. 2003).

The reasons for poor adoption of high yielding, modern maize varieties are complex. Farmers report that new varieties are susceptible to weevil attack during storage. This paper details the results of a participative research program on maize storage in East Timor.

Methods

Location

The research program worked with 18 farmer groups in three regions of East Timor (Loes, Maubara and Remexio). One storage experiment was established at each of 18 sites and included the local maize varieties and local storage methods.

Design

The typical experiment consisted of six treatments; two varieties (traditional and modern) stored using three different methods. The three methods were; traditional storage of cob in sheath, storage of threshed grain in a woven ploy sack, and an air-tight jerry can. Traditional storage varied with location and included storing above a fire place, hanging in a tree or storage in an elevated house that was purpose built to store grain. Each variety/treatment combination was replicated twice and consisted of either 50 cobs in sheath or 2kg of threshed grain.

Maize used for the experiment was purchased from farmers, and the farmers kept the stored maize away from rodent attack. All grain was clean and weevil free at the beginning of the experiment. The shelled maize was shelled by hand. Staff visited each field site once every three weeks (a total of 11 visits per location). During each field visit, the staff recorded the percent of weevil damaged grain in each experimental unit by destructive sampling.

Results

Maize stored in air-tight jerry cans showed no weevil damage. This was true for both modern and traditional maize varieties, at all 18 test sites.

Local and introduced maize varieties were damaged by weevils at a similar rate when stored in a sack. For this storage method, both types of maize were damaged quite quickly, with more than 50% of the seeds damaged by weevils after 21 weeks of storage. Both traditional and modern maize varieities showed similar rate of infestation with weevils when stored in a sack (see Table 1).

Table 1. Percent of grains damaged by weevils when stored as threshed grain in a sack, and stored as a covered cob using three traditional methods and for local and modern varieties.

Number of weeks of storage	Threshed maize stored in a sack		Above a fireplace (cobs)		Hanging in a tree (cobs)		In an elevated house (cobs)	
	Local	Modern	Local	Modern	Local	Modern	Local	Modern
3	0.0	0.0	0.0	0.0	0	0	0.0	0.0
6	0.0	0.0	0.0	1.3	0	0	0.0	0.0
9	1.1	4.1	0.0	0.4	3.1	1.4	0.0	0.0
12	4	4.1	0.0	0.2	1.8	4.1	0.0	0.0
15	18	30.4	2.0	6.5	0	0.1	0.0	1.3

18	31.8	44.7	1.0	2.3	5.1	7.7	0.0	0.0
21	61.4	60.1	6.4	0.0	0	4.6	0.0	60.5
24	70.7	67.7	2.6	1.7	10.0	2.3	0.0	24.3
27	86.2	83.2	1.7	0.6	2.0	0.0	16.7	8.4
30	92.4	93.2	2.8	20.0	5.3	50.7	1.0	1.6
33	97.0	99.3	0.0	22.0	0.0	48.9	0.0	97.8
LSD $p<0.05$			3.0					

The storage of local maize in the sheath, by traditional methods, experienced very little weevil damage during the 33 weeks of testing. The modern varieties suffered more weevil damage than the local maizes. Over the last two sample times, (30 to 33 weeks after starting the storage treatments) local maizes suffered 1.5% damage due to weevils, where as the modern varieties suffered 40% loss due to weevils (Table 1). There was no significant differences between the three regions included in the testing.

Conclusion

Local maize populations were more resistant to storage when stored as a covered cob using a variety of local methods .When stored as threshed grain, in a poly sack, local and introduced maizes suffered similar rapid weevil attack, making the maize inedible after 15 weeks of storage.

It is suggested that new introductions of maize for East Timor be selected for weevil tolerance when stored in local conditions, as part of adaptation testing. There is also great potential to increase maize farming yield and sustainability through the combined used of modern varieties and air-tight storage systems.

References

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