

Farmers' perceptions of yield losses due to insect pests and methods for assessment in pearl millet

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Abstract. On-farm surveys conducted to establish a better understanding of millet farmers' perceptions on crop loss and methods for assessment indicated that farmers were aware of the benefits to be derived from crop loss assessment. Findings from these surveys also showed that on average 82.6% viewed crop loss assessment as important versus 17.4% who viewed loss assessment as unimportant. Among sample farmers, an average 85.3% assessed crop loss qualitatively versus 14.7% quantitatively. Visual assessment of damage was most preferred, followed by insect numbers as a means for assessing crop losses. On average, 50.6% versus 40.9% of sample farmers across village farms attributed crop losses primarily to the pest damage, then insect numbers, respectively. Implications of these findings and applications in pearl millet pest management are discussed.

1. Introduction

Severe damage to pearl millet (*Pennisetum glaucum* (L.) R. Brown.) by insect pests, has been of increasing concern to farmers and workers in pest management programmes. The crop is attacked by numerous insects which feed at all growth stages (Nwanze and Harris, 1992). As a result, yield is drastically affected in this crop, whose importance as a major carbohydrate source in the Sahelian zone of West Africa cannot be overemphasized.

Crop loss assessment is a key component of any pest management strategy, and is the first factor to be considered when justifying decision-making for a particular integrated pest management strategy. Reasons for assessing crop losses include: (i) to estimate the effectiveness of a particular control, (ii) to define the pest status of a particular insect and establish economic thresholds and economic injury levels, and (iii) to define a plan of action/strategy for future research priorities, preferences, and allocation of resources.

Despite many attempts to assess crop loss of pearl millet much needs to be done (Nwanze, 1988; Jago, 1995). Standardization methods for widescale and long term evaluations of losses have been tried; however, differences in methodology make comparisons and on-farm extrapolations quite tedious and inadequate.

A recent survey of farmers' perceptions of insect pests and control methods (Young and Baidu-Forson, 1995) indicate that farmers were aware of insect pests and associated damage to millet. However, there were cases where identification of insect and damage were confused; which indicated the need for further training of farmers.

As a follow up, this paper reports results of surveys to assess farmers' perceptions of crop loss due to insect pests in pearl millet, with particular reference to methods used and indicators of crop losses. Implications on the development and on-farm applications of crop losses assessment technology are discussed.

2. Farmers' perception of crop losses and methods for assessment

2.1. Experimental procedures and surveys

Surveys were conducted in five villages (Damari, Djakindi, Dogal Kaina, Sadore, and Sebery) in western Niger, during the millet growing season in 1996, to assess farmers' perceptions concerning crop losses and approaches to assess them. In all, 10-15 farmers in each village were chosen at random and interviewed using prepared questionnaires. Farmers were asked questions on the importance of crop loss, how they assess crop loss, and what constitutes the most important indicator of crop loss.

3. Results and discussion

Results on farmers' perceptions of the importance of crop losses are presented in table 1. In Djakindi farmers were nearly split equally in their view on the importance of crop losses assessment. Farmers in all the other villages surveyed (over 70%) viewed crop loss assessment as important. This could be due to lack of knowledge on pest or difference in crop management practices. Across villages, an average 82.6% versus 17.4% viewed crop loss assessment as important.

Table 2 shows how farmers say they assess crop losses. In all cases, fewer than expected number of farmers cited quantitative assessment. The general response of farmers in the villages surveyed indicates that the qualitative method of yield loss assessment is popular with 85.3% versus 14.7%. Under this, visual assessment of damage caused by insects is widely used, followed by visually relating insect populations/damage to yield and comparing with the previous season's crop (table 3). This is in line with normal expectation if one considers the high illiteracy rate of farmers and the complicated mathematical manipulations associated with the quantitative assessment.

When asked what constitutes the most important crop loss indicator, farmers were evenly split between pest damage and

insect population build-up (table 4). On average, 50.6% versus 40.9% indicated pest damage against insect numbers respectively, across villages.

Most farmers interviewed indicated the use of some method of control measure to reduce pest numbers, and damage to millet heads (table 5). Traditional methods of control such as prayers and the use of certain plants (or plant parts) were the most prominent. These results are consistent with those reported by Youm and Baidu-Forson (1995). All farmers thought that pest control methods are important and could lead to yield increase, indicating an awareness by farmers of the relationship between insect infestation and crop yield losses.

4. Conclusion

As for other cereals, pearl millet is susceptible to multiple attack by numerous insect pests from seedling to maturity. This

Table 1. Farmers' perceptions on the importance of crop loss assessment^a

Village	Response (%) ^a	
	Important	Not important
Damari	93.3	6.7
Dogal Kaina	93.3	6.7
Djakindi	53.3	46.7
Sadore	73.3	26.7
Sebery	100.0	0.0
Average	82.6	17.4

^aData are based on a sample size of 10–15 farmers per village.

Table 2. Percent response on how farmers' assess crop loss due to insects^a

Village	Quantitative (visual)	Quantitative
Damari	93.3	6.7
Dogal Kaina	66.7	33.3
Djakindi	86.7	13.3
Sadore	86.7	13.3
Sebery	93.3	6.7
Average	85.3	14.7

^aSample size, 10–15 farmers per village.

Table 3. Farmers' methods for assessing crop losses in millet^a

Village	Method (%)				
	Insect damage	Insect numbers	Comparative with damage in neighbour's field	Comparative with previous season's damage or yield	Presence of eggs or frass
Damari	100.0	0.0	0.0	0.0	0.0
Dogal Kaina	6.7	33.3	13.3	46.7	0.0
Djakindi	25.0	33.3	8.3	8.3	25.0
Sadore	62.5	12.5	12.5	12.5	0.0
Sebery	42.9	0.0	21.4	35.7	0.0
Average	47.4	15.8	11.0	20.6	5.0

^aSample size, 10–15 farmers per village.

makes assessment of crop loss very difficult and time consuming. In addition, reliable methods to assess crop losses for on-farm trials are lacking due to variability in choice of plant materials and soil conditions. Most of the methods currently used are often of research interest and fall short of predicting on-farm losses. It is important to gather more reliable information on crop loss in pearl millet for the development of reliable techniques for assessing such losses to define insect pest status and integrate this in pest management. Since farmers are aware of the economic importance of crop losses it should be possible for agricultural extension services to transfer crop loss assessment technology to on-farm application with farmers' participation.

Table 4. Farmers' perceptions on causative indicators of crop loss^a

Village	Indicator		
	Pest damage (a)	Insect number (b)	Both (a) and (b)
Damari	100.0	0.0	0.0
Dogal Kaina	14.3	85.7	0.0
Djakindi	0.0	64.3	35.7
Sadore	78.6	14.3	7.1
Sebery	60.0	40.0	0.0
Average	50.6	40.9	8.5

^aSample size, 10–15 farmers per village.

Table 5. Farmers' methods for assessing crop losses in millet^a

Village	Method (%)			
	Modern ^b	Traditional ^c	None	Mechanical ^d
Damari	26.7	46.7	26.7	0.0
Dogal Kaina	0.0	82.4	0.0	17.7
Djakindi	53.3	33.3	6.7	6.7
Sadore	33.3	66.7	0.0	0.0
Sebery	53.3	46.7	0.0	0.0
Average	33.3	48.5	6.7	4.8

^aSample size, 10–15 farmers per village.

^bChemical control was cited as the main control method.

^cPrayers and the use of certain tree parts were cited as the popular methods.

^dHand picking and burning, etc.

Studies have shown that the perceptions on crop losses and methods for assessment may slightly vary from one village to another, thus it should be helpful to have a farmer participatory approach and training to improve overall knowledge and understanding on losses across regions.

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