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Assessment of Sugarcane Damage by Jackal and Rat in Sripur area of Bangladesh

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ABSTRACT

Three species of rats, *Rattus rattus*, *Bandicota bengalensis* and *Nesokia indica* and the jackal. *Canis aureus*, cause damage to sugarcane in Bangladesh. Farmers reported to the Vertebrate Pest Section, BARI, in late December, 1983, that they wee e suffering heavy rat and jackal damage to their sugarcane plots in Sripuar area of Gazipur District, this survey was done in that area in late February at the time of sugarx ane harvest. Three methods of damage assessment were used to estimate jackal and rat damage to the sug arcane.Jackals caused 24.4 damage, and rats caused 7.5 damage on the 5 by 5 m sampled plots. The weight losses of sugarcane stalks damaged by jackl ls and rats were 32 and 14.3, respectively. Trapping results indicated that *R. rattus* was the major rat species present, while only a few *B. bengalensis* were founds. Da mage to sugarcane in this area by jackals was far more severe and important than that by rat. There was no statistional difference between three damage assessment methods in estimating jackal damage but the differences were significant when measuring rat damage to sugarcane.

INTRODUCTION

Sugarcane is one of the major cash crops in Bangladesh. The per acre yield of sugarcane and extracted sugar is very low in the country, averaging only about 17 tons of cane per area (Wennergren *et. al.* 1984). Insects, rodents and jackals are the main pest problems in sugarcane cultivation in Bangladesh.

Pemberton (1925) reported that rats damaged 25% to 40% of the total canes in Hawaii. Elliott (1925) reported on an average 32.9% stalk damage and 5.9% sugar loss due to rate damage at the Honokaa Sugar Company plantation in the island of Hawaii. Hood *et. al.* (1970) estimated an annual loss of $4.5 million due to rat damage of sugarcane in Hawaii.The Hawaiian sugarcane industry suffers extensive losses to rats, up to 40% of stalks are damaged at harvest in some fields (Hood *et. al.* 1970 and Lindsey *et. al.* 1971).

Damage by rodents and jackals can affect both the weight and sugar content of cane. Sugar content is reduced by the general debilitating effect of vertebrate pest damage on the plant, by fermentation of sugar in damaged stems, and by an increased susceptibility to diseases (Bates, 1969). Such secondary losses may be far more serious than the direct losses due to consumption of cane (Doty 1945; Hood *et al,*. 1970).

In Guyana, Bates (1960) found that damaged canes were 21% lighter from dessication or physical removal of tissue than undamaged canes, and there was a further loss of 12% sugar content compared with undamaged canes. Gupta *et.al.* (1968) reported from India that damaged canes lost 19% of weight and 24.5% sugar in conditions where an average of 3% of the stalks were damaged.

Reports by farmers of heavy rat and jackal damage to sugarcane plots in the Sripur area were received by the Vertebrate Pest Section, Bangladesh Agricultural Research Institute, in December 1983. In January 1984, traps were set in some fields in this area and 2 species of rats, *Rattus rattus* and *Bandicota bengalensis*, were caught. Besides rat damage to the sugarcane stalks, there was abundant evidence of jackal damage to the stalks. Harvest of these plots was set for mid-to late

February. The objectives of this survey are to determine how much or per cent of sugarcane stalks were damaged by rats and jackals and to compare several different methods of damage assessment for accuracy and ease of use.

MATERIALS AND METHODS

Damage assessments of the jackals and rats were carried out in the later part of February, just at the time of sugarcane harvest in the Sripur area, approximately 20 km north of the BARI campus Joydebpur.

Three methods were compared for damage assessment :1) cutting and examining all canes from 5 by 5 m plots in each field ;2) cutting and examining all canes in 2 by 2 m plots in the same field, and 3) without cutting the canes, using a point -circle area method where all canes growing within 1.5 m radius of a randomly selected point were examined for damage. To establish the point -circle area, a 1.5 m length of cord was used, attaching it to a randomly selected cane in the survey area. On all sampled plots, total internodes for each examined cane stalk were recorded together with the number of internodes damaged by either jackals or rats. Five fields were examined for this survey. Ten samples from both the 5m x 5m and 2m x 2m plots were taken, and 21 samples of the 1.5 m point -circle radius were taken. Analyses of variance for unequal sample sizes were done using arcsin transformed values of per cent infestation data of jackals and rats. Both jackal and rat-damaged canes were weighed and compared in weight with an equal number of undamaged canes.

Snap traps were set in 3 fields in January to capture rats for identification. These were run for 3 nights.

RESULTS AND DISCUSSION

The results of the sugarcane damage assessments are presented in Table 1. There was similarity among the methods when assessing damage by jackals, which varied from 23.2 to 24.4% of all stalks damaged.Statistical test also showed no significant difference among the mean percentages of jackal damaged canes sampled by the three methods. There was poor agreement, however, when examining for rat damage, which varied from 2.2 to 7.5% by the three methods. Statistical analysis of the data also showed significant difference among the per cent means of rat damage for the three sampling methods.The reasons for this are not clear but one factor may be the distribution of the rat damage which did not occur in all fields and was characterized as clumped in nature where it did occur within a field. This could have led to differences between the methods depending upon what portion of the the fields the sample plots were drawn from. The jackal damage, in contrast, tended to occur throughout a field and was found in all the fields. This is so because the jackals are more mobile than rats, do not live in the field, and are not tied to a burrow system or nesting area within the field.

The loss of weight of the cane stalks damaged by rats and jackals was measured. The weight of jackal-damaged stalks (n= 172) was 81.0 kg, while undamaged stalks weighed 119.1 kg, a weight loss of 32% ,i. e. 2.2 tons cane per hectare (TCH) considering 1,00,000 stalks as the total number per hectare. Rat-damaged stalks (n-40) weighed 30 kg and undamaged stalks weighed 35 kg, a weight loss of 14.3% i.e.l .25 TCH. In the case of the fields examined here, the weight loss of 32% due to jackals would have to be multiplied by the proportion of stalks damaged (.232 to .244) to estimate the loss in yield. This could be expected to run from 7.4% to 7. 8% of the expected yield.

Table 1. Assessment of jackal and rat damage to sugarcane fields, Sripur.

Observations	Damage assessment method		
	5 by 5 m plot	2 by 2 m plot	1.5 m radius point-circle
No. of samples	10	10	21
Total No. canes	2095	463	1189
No. canes damaged : jackals	521	105	291
No. canes damaged : Rat	262	27	30
%canes damaged : jackals	24.4	23.2	23.8
%canes damaged : rats	7.5	2.2	2.4
Total No. internodes	35623	8071	20953
Internodes damaged : jackals	2121	327	1544
Internodes damaged : rats	754	107	79
%internodes damaged : jackals	6.0	4.1	7.4
%internodes damaged : rats	2.0	0.3	0.4

Calculated among groups F value (d. f. 2 & 38) for jackal damages : 0.0287 ($p > 0.05$)
Calculated among groups F value (d. f. 2 & 38) for rat damages : 3.911 ($p < 0.05$)

However,because the stalks damaged by jackals are almost always killed, the expected loss of yield would be higher than this.The weight loss attributable to rats of 14.3% would be expected to result in much less loss of yield. If the damage ranges from 2.2 to 7.5%then loss of yield due to rats would vary from 0.3 to 1.78%.

The 5 x 5 m and the 2 x 2 m sampling plots used in this present study are equivalent to the cut- and -pull methods (Hood, 1968) used in previous studies of rat damage to sugarcane. In these methods of sampling, the sugarcane stalks are cut from the sampling plot and examined for vertebrate damage outside the field. The methods are destructive and can only be done at the time

of harvest since this is the only time the farmer would allow such actions. These methods also are time-consuming, requiring either the presence of labourers in the fields to cut the stalks or that the observer himself does the cutting. In contrast, the point-circle method is non-destructive, requires the least time of the three methods to carry out and can be done without the help of outside labour. Another advantage is that the method would allow repeated sampling of the same plots to determine cumulative damage and determination of the time when damage is most intense, neither of which can be done by a method requiring the cutting of cane stalks.

Rat damage was clumped in distribution, depending somewhat upon whether due to *R. rattus* or *B. bengalensis*. Damage by *R. rattus* would not necessarily be limited to a burrow system since these rats nest above ground and would be expected to move about more than the bandicoot rats, which probably forage in the sugarcane in close proximity to their burrow systems. Most of the damage seen in this study was due to *R. rattus*. During 65 trapnights with snaptraps carried out in January 1984, a total of 24 *R. rattus* and 5 *B. bengalensis* were captured from the surveyed fields. The rats chewed boat-shaped areas out of the sugarcane stalks between the nodes. Usually the basal two to five internodes were attacked on upright stalks, but on lodged stalks the number of damaged internodes was quite often higher on the stalks. Rat damaged stalks were rarely killed outright and some sugar-production-undoubtedly continued despite the damage.This is the first report of sugarcane damage by *R. rattus* and *B. bengalensis* in Bangladesh. Previous study by the vertebrate pest section of BARI indicated sugarcane damage at Ishurdi and Muladuli farm by *Nesokia indica* only (Poche,*et. al.* 1982; Anonymous, 1980).

Jackal damage was seen throughout the several fields examined. Damage by jackals to sugarcane stalks is much more severe than that due to rats. Jackals crush the internodal areas with their jaws to obtain the juice. This action invariably killed the stalk and it dried up. Many farmers cut the dead stalks out of their fields as they are found. The jackals generally crush three to six internodes per stalk. Because the stalks die, the loss of weight due to jackal damage was 32% as compared to undamaged stalks. The loss of sugar yield is probably more closely correlated with the number of stalks damaged, since these stalks are discarded either before harvest or at the time of harvest.

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