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Estimation of Rodent Damage on Coconut Plantations and Sugarcane in Sindh

Rajab Ali, [1]S. Fatima Mahdi, M. Farhanullah Khan
Pakistan Agriculture Research Council, Tropical Agriculture Research Center, 75270-Karachi, Pakistan
[1]Department of Botany, University of Karachi, 75270-Karachi, Pakistan

Abstract: Different climatic zones and with complex tropical patterns and crop practices favor various pest species in Pakistan, including vertebrate pests second to insect pest species. Amongst vertebrate pests, overall rodents are threatening more than any other group. Presently, in Karachi, Malir Distt., coconut plantation have been surveyed for the estimation of the extent of the rodent damage thereon. Estimation of sugarcane damage due to rat infestation at post-harvest stage in Sindh was made at four sample sites in Thatta and Sanger districts. Therefrom, samples were collected randomly and analyzed to determine the extent of damage. The damage due to rodent activity has been estimated as 15%±5 and 7.5±1.5 in coconut and sugarcane respectively.

Key words: Rodents, Sindh, losses, sugarcane, coconuts, damage

Introduction

Pakistan has different climatic zones with complex tropical patterns and practices. These conditions favor various pest species, including vertebrate pests second to insect pest species. Consequently, the country suffers economic losses due to their activities. Vertebrate pest comprises of rodents, birds, wild boar and porcupines etc. In some cases, vertebrate pest damages have become limiting factor in the introduction of several crops such as sunflower, sugarcane and maize which are seriously damaged by them. Rodents are a great threat to all produces in Pakistan (Pervez *et al*., 2001). The porcupine (Hystrix indica) a rodent, is comparatively large animals (i.e. up to 10 kg weight). It is capable to travel several kilometers in a single night. Porcupine is a serious pest in forest plantations, roots and vegetable crops and maze fields as well (Khan *et al*., 2000 and Ahmed *et al*., 2001). Southern Sindh has a largest concentration of poultry, where rats on poultry farms may cause direct or indirect losses to the poultry producer and often they snatch all the profit by attacking over the eggs, young ones and feed. The losses are also direct consumption of poultry feed. One rat can consume about 10 g of feed per day and destroy ten time of this amount during feeding by its dropping and urine, birds may refuse to at such contaminated feed or do not take the full ration padday, eggs are eaten up or damaged by the rats before the collection. Some time young chicks are also killed. Moreover, farmers buildings are damaged by the rats burrowing under floors and walls. Diseases such as salmonella and leptospirosis can be transmitted to poultry birds from the rats. Wheat is also vulnerable to rodent attack in both irrigated and rain-fed (Barani) area (Prakash, 1988 and Fluk *et al*., 1980a). The rats are mainly active after dusk and the farmers become aware of the problem when they notice cracked and sucked eggs. The rat activity signs such as rat holes in the feed bags and holes chewed in doors or open burrows and dirt piles. When infestation is heavy, the rats can be observed most of the time in days light. Dark greatly marks known as "rat smears" are cheerily visible surrounding the favorite runways along walls or roof beams. Important rodent species recorded are Rattus rattus, Mus musculus and Rattus norvegicus. Therefore, rats are a big threat in Pakistan, as they are causing a great loss in this country (Pervez *et al*., 2001). Pervez and Ali (2001) have reviewed 7 - 15% losses due to rodent activity on sugarcane in different conditions. Present study was carried out to check the losses in sugarcane and coconut crops estimated due to rodent activities in Sindh.

Materials and Methods

Three orchards of coconut plantation have been surveyed for the estimation of the extent of the rodent damage thereon, in Karachi, Malir District, area during 1997-98. Fort nightly, Young and immature fruits dropped due to the rat activity were recorded and the damage on mature fruits were recorded at the time of harvesting. A number of 100 samples from each orchard was collected and analyzed for rodent damage. Results are presented in the Table 1. Estimation of sugarcane damage due to rat infestation at postharvest stage in Sindh was made at four sample sites Thatta and Sanger districts. Therefrom, samples were collected randomly and analyzed for the extent of damage (Socal and Rohlf, 1969). The extent of damage was estimated after Dubey and Kawasthi (1991) by recording the number of damage and healthy, as the rat damage to the cans was identified on the basis of canoe

shaped cavities formed in internodes on internode 1,2 and above or at the basal part. Results are analyzed as per methods described by Socal and Rohlf (1969).

Results and Discussion

Field rat which usually damage the wheat crop are Bandicota bengalensis, Millardia meltada, Nesokia indica and Mus sp. Rain-fed as well as winter wheat crops are vulnerable to rodent attack in Pakistan. Bandicota bengalensis is the most abundant species followed by Rattus rattus, Millardia meltada and Nesokia indica. Presently, the damage due to rodent activ ity has been estimated as 15%±5 and 7.5±1.5 in coconut and sugarcane respectively. The damage estimates to wheat produce vary from 7.5-15%. Meriones hurriane was found to be a serious pest of wheat in the North West Frontier and Sindh (Prakash 1988 and Fluk *et al.*, 1980b). Prakash (1988) estimated up 0.4% loss of stored grain during storage, due to vertebrate pest infestation. The damage fluctuates from year to year and from one area to another. Agricultural practices also exert influence on the damage, for instance, fields where the wheat is grown after paddy harvest the damage is more severe. Likewise, wheat crop sown in sugarcane field suffers considerable damage due to the previously established vertebrate pest species. According to surveys conducted by the Vertebrate Pest Control Laboratory, in the irrigated canal growing tracts of both the Punjab and N.W.F.P. provinces, there was an average of three percent losses to wheat due to field rats and five percent of farmers were suffering with more than 10 percent loss to their wheat crop. The damage was estimated as more severe in the barani area (Khan and Symthe, 1981 and Khan, 1982). These reports are in line with the present findings where an average 15%±5 loss in coconuts and 7.5%±1.5 in sugar cane has been estimated (Table 1 and 2).

In Pakistan, there are 43 different kinds of rodents, the majority is known as rats and mice but include porcupines, and desert gerbils (Khokhar and Rizvi, 1998). In rice fields Lesser bandicoot rat, Bandicota bengalensis is the major pest in the southern part of Sindh. Millardia meltada, Nesokia indica and Mus sp. are secondary pest of rice crop. In sugarcane crop, M, meltada and N. indica are abundant and cause damage to canes and their roots. In irrigated wheat fields, B. bengalensis and M meltada are the major pests in the Northern Sindh. In rain fed area of Sindh, the wheat crop is damaged by sand rat, Meriones hurrianae. Three rodent species, Rattus rattus, Mus musculus and Tatera indica also found infesting grain storage throughout the year in Sindh.

Table 1: Coconut damage due to Rattus spp. in Karachi ruler area

# Orchards surveyed	# Specimen examined/orchards	% Damaged specimen/sample	%Immature nuts*	%Maturenuts nuts*
3	100	15±5	70±2	30±2.3

* % mature or immature nuts in total damaged nuts,
* Fiducial limits are calculated as: mean±1.96.[(SD)2.n-1]0.5

Table 2: Estimation of sugarcane damage due to rat infestation at postharvest stage in Sindh

Total sample sites	# sample collected	% Infestation found*
4	50	7.5±1.5

Fiducial limits are calculated as: mean±1.96.[(SD)2.n-1]0.5

The rats have been causing problems to farmers ever since the commencement of agriculture. The developed conditions favored rats better, as the rat has the food and taste preferences almost identical to man, therefore, the best crops are damaged by them. Consequently, rats have learned to depend on man for food and shelter. They infest homes, shops and godowns and have learned to thrive on crops. Rats have been living on man for thousands of years, and will continue to do so in future. There is no way to totally eliminate rats. All men can do is to use available control method to keep rat population at such a low level that crops' are protected and damage by rats should minimize. The object is to feed but man himself, not to rat.

Fluk *et al.* (1981) collected data on the abundance, reproduction and diet of rice field rats, during three rice seasons. At rice harvest, Bandicota bengalensis nearly doubled its litter size and tripled its pregnancy rate and greatly increased in abundance. Millardia meltada remained abundant and kept a relatively high pregnancy rate over all stage of crop development. These differences corresponded to the difference in diet. Before the rest of grain ripening, the Millaradia consumed weed seeds, insects and scattered grain etc., while the diet of Bandicota contained primarily low energy food like rice stems and unidentified plant fibers (Fluk *et al*., 1981).

During mid season Nesokia indica could be seldom caught above ground. However, whenever it was observed it mostly unidentified plant fibers. When the grain was ripened Nesokia was caught on the surface and stomachs contained principally rice grain. Nesokia showed a lower pregnancy rate and smaller litter size but apparently greater adult survival rate. They bred more often in the cooler months during and after harvest (Lathiya, 1978).

In the present findings where an average 15%±5 loss in coconuts and 7.5%±1.5 in sugarcane has been estimated (Table 1 and 2). In a survey of 250 farms that sugar production reduced upto an average of 10.7% in 1978 and 7.7% in 1979, due to rodent infestation (Fluk *et al*., 1980a). Many farms appear to suffer more i.e. twice the average loss. The species Rattus rattus is also a pest of coconut in Malir and found by trapping to be abundant in this

plantation. It is capable of climbing very tall plants and commonly nests in the crown of such trees. The damage varied from scarring to complete penetration of the husk and soft shell. The damage ranged from slight gnawing on the small nuts to complete consumption of the meat inside the cavity of large and medium coconuts. The nuts were usually tunneled into near the basal portion or about half way along the length of the pericarp or outer husk. The basal portion of the nut is more accessible to rats than the lateral or distal portions. The damaged nuts were categorized into small and large (undeceive of medium size). Coconut fall of the palm few days after the inner shell is penetrated and then take further 2-3 weeks to turn completely brown. Khan (1978) has reported that the number of damage nuts varied according to the size of nuts location and extent of damage.According to his report 222 damage nuts examined during three weeks of counting 71.85% were smaller and 28.15% as large nuts. Though the smaller nuts tended to have more damage whilst deeper penetration was noted in large and medium sized nuts. Heavy damage was recorded on the palms along the plantation boundaries and particularly hedge lines from where the rats find additional shelter. These reports are also in line with the present findings.

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