



ISSN - OLD-2231-3613, NEW-2455-8729
International Educational Journal

UGC APPROVAL NO. - 42652

CHETANA

Received on 15th July 2017, Revised on 20th July 2017; Accepted 20th July 2017

ARTICLE

Study of Population Dynamics of Rodents in Different Crops and Soil

*** Deepak Kumar Sharma**

State Coordinator, Youth Skill Development Cell

Commissionerate, College Education, Rajasthan

Dr. Radhakrishnan Shiksha Sankul, Jaipur-302016 (India)

Email-dksharmajaipur64@gmail.com, Mob.- 9414320276

Key words: *Burrows census, Yield reduction, computation of losses, Rabi crops, Types of soil. etc.*

Abstract

Study of population dynamics of rodents in different crops, in different kind of soils, migration of rodents, damage in various crops, computation of losses in fields were performed.

The burrow intensity in all the Rabi crops shows a wide fluctuation at different stages as well as between different crops and adjoining areas and structures. The number of burrows during seedling stage were nil. An increase was observed during growth and maturity stages. The rodent species showed a graded preference to different crops and stages. The highest preference showed to Wheat than Barley, Gram, Pea, Mustard respectively. The preference to different stages in wheat and barley was maturity stage than growth stage and seedling stage respectively. A comparison of rodent population to soils reveal that the number of rodents was maximum in the sandy soil followed by clay soil and minimum in saline soil.

Introduction

It is almost axiomatic that the superiority in adapting themselves to almost all habitats and changing environmental conditions have made rodents the man's most dreaded enemy. Rodents are of great economic importance to mankind because of their pestilential role. The purpose of the present investigation is to assess the rodent population dynamics in different crops, type of soil and crop stages.

Material and Methods

Three villages of District Bharatpur (Rajasthan) were selected for experimentation i.e. Dhanota, Jagheena and Sahnawali. For rodent population studies in fields, indirect method of burrows census as reported by Prakash *et al* (1971) was adopted to know the burrow intensity in different kinds of soils and crops. The crop fields, bunds, water channels and pathways were surveyed at different developmental stages of the crop in different seasons. As most of the nocturnal rodents do not indulge in extra burrowing while diurnal desert gerbils after venturing out of their burrows in the morning feed continuously for half an hour and do not indulge in burrow digging. These habits of the nocturnal and diurnal rodents paved a useful path for census method. In the late evening all the burrows were plugged with mud in a measured piece of land. All the freshly opened burrows next morning were treated as live burrows. The tentative identification of burrows of different species was carried out on the basis of external appearances (Sagar and Bindra, 1970, 1971).

Assessment of loss in Wheat in Pre-harvest season

The study was carried out in Three villages viz. Dhanota, Jagheena and Sahnawali during Rabi crop season. Three fields of wheat were selected randomly in each village. The tiller count method was adopted to assess the damage (Anonymous, 1981; Wilson, 1972). In each field, six plots each of one square meter were studied, following a random sampling technique, covering the periphery as well as the centre of the field. Observations were taken fortnightly on the various aspects at different stages and sub stages viz. Crown root initiation (CRI). Early tillering, late tillering, jointing, milking, dough and ripening sub-stages as per recommendation of Second All India Workshop on Rodent Research and Training (Rodent Newsletter 5(2), 1981).

Assessment of loss at vegetative growth

The number of healthy and damaged tillers were counted at each observation. All observations were recorded. The actual loss was proportional to accumulated number of cut tillers at the time of harvest i.e. sum of losses of different growth stages.

Yield reduction

At the time of harvesting the yield from the healthy tillers was recorded. The yield from the regenerated tillers was evaluated separately the average yield from regenerated tillers of plants was deducted from the average yield of normal tillers of plants. The loss in yield was

worked out as per method of AICRP. The loss in yield was transformed to per cent yield reduction or loss per hectare for comparison purpose.

Results and Discussion

Population Fluctuation in Rabi Crops

The survey of different crop fields during Rabi Crop revealed the occurrence of different murid species. The population density fluctuated greatly at different stages of growth of plant. It ranges from 15-71 burrows during same Rabi Crop.

Wheat crop

In wheat crop the rodent population varied from average number of 36.5 to 59.7 living burrows/ha. At seedling stage most of the burrows were concentrated along the bunds and only few were observed along the water channels. Inside the crop, few living burrows were observed. Along with the growth and maturity stages, the number of the living burrows increased. The intensity of burrows inside the field is maximum during the maturity stage. High density of rodent population at maturity stage was confirmed by the maximum damage noticed at this stage of crop.

Barley

The rodent burrow intensity in barley crop is somewhat less than the wheat crop, but the trend of the burrows inside the crop is exactly same. The number of living burrows were almost zero to few in seedling stage and maximum during maturity stage.

Gram

The burrows intensity varied from average 27.2 to 46.32/ha in Gram crop. The number of the burrows on the bunds are more followed by channels and very less inside the crop. This crop is preferred less by the rodents as compared to cereal crops.

Pea

It is sown in the low lying area where water accumulates during the rainy season. The rodent intensity observed is minimum during seedling stage and increase is also very less.

Mustard

Mustard is the major Rabi Crop of the region. This crop is sown in more than seventy percent of the total cultivated area of the district. The rodent infestation in this crop is very

less. The intensity varied from average of 12.10 living burrows per hectare during seedling stage to average of 17.4 living burrows per hectare during maturity stage crop.

The burrow intensity in all the Rabi Crops shows a wide fluctuation from 12 to 68 burrows at different stages as well as between different crops and adjoining land bodies i.e. bunds, channels and pathways. The number of burrows, during seedling stage were almost negligible which increases therefore during growth and maturity stages. This may be attributed to the fact that when the plain fields were converted into crop fields by deep sowing, the rodent species migrate to bunds and water channels, mainly due to the mass destruction of their complex colonies. The rodent species showed a graded preference to different crops and stages. The preference to different crops are shown in the manner like Wheat than Barley, Gram, Pea and Mustard respectively and the preference to different stages in wheat and barley was maturity stage than growth Stage and seedling stage.

The rats had less interest in the mustard crop. This may be because of the pungent smell and bitter taste mustard. The rat infestation in gram crop is also less which may be due to alkaline coating over the vegetative parts of gram.

Population dynamics in different types of Soil

The sandy soil has the poor water holding capacity. The number of live burrows which were about 54.30 per hectare before the start of winter increased to 58.42 per hectare during spring. The population again starts decreasing in the summer and reaches to the minimum level in rainy season. In autumn the rodent activity again starts increasing. The difference in the population density during May and November was not too wide. This study was conducted in the village Sahnawali, Dhanota and nearby areas.

The permanent saline soils are confined to patches so the rodent population in this soil was studied in Jagheena and its nearby area. The burrow intensity was minimum during the rainy season and was higher during winter, spring and autumn. It varied from 12.70 to 23.00 per hectare. The highest density was in the month of February. It is interesting to note that the burrows intensity in the saline soil was about thirty percent of sandy soil and only half of even less to that of the clay soil during spring, winter and autumn. During rainy season, the intensity in the saline soil is about 25 percent to that of the sandy soil and about 34 percent to that of the clay soil. The *Meriones hurrianae* was the dominant rodent species there.

In the clay soil, the proportion of sandy particles is less than that of the silt particles. It has good water retention capacity. The burrow intensity varied from 31.12 to 40.92 per hectare.

The highest burrows intensity as recorded during the month of February and lowest the in August month. *Rattusmeltada* and *B. bengalensis* were the prominent species.

The fluctuation of rodent population cannot be attributed to climatic factors as in the same season, the intensity varied in different soils. A Comparison of rodent population to soils reveal that the number of rodents was maximum in the sandy soil followed by clay soil and minimum in the saline soil. These findings show that soil permeability, texture, saturation value and field density might control the population density.

The Loss Assessment

The rodent cause maximum damage to wheat then to gram and mustard. So the studies were concentrated to assess the extent of damage in wheat crop.

The damage caused by rodents were recorded at different growth stages and substages of wheat which is largely sown in the area. The per cent loss was highest in maturity stage as compared to growth and seedling stage respectively. The damage was minimum in seedling stage. It was characterized by plucking and eating half germinated seeds, damage to young stages by their burrowing habit, cutting the tillers the base and bending the tillers and subsequently removing the ears. Initially the damage was confined to the boundaries, but at jointing substage of growth stage these pests started entering in the crop. During flowering and milky stages the rodents cut the tillers into small pieces and prefer to eat the milky grains. During dough and ripening substages of maturity stage apart from cutting the tillers and ears the rodents store the ears in the burrows for future consumption.

As the tillering occurs, the plant stand becomes more and more dense thus making the safe shelter places for the rodents, secondly as the plants grow the plant tillers become harder. The rodents prefer the hardertillers than the dilicate ones. They also prefer the milky seeds because these are more palatable. At the same time they start storing them in their burrows. The poor infestation in the seedling stage may be due to the sparse and less plant stand.

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*** Corresponding Author:**

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State Coordinator, Youth Skill Development Cell
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Dr. Radhakrishnan Shiksha Sankul, Jaipur-302016 (India)
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