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COW DUNG AND POULTRY LITTER FOR REPELLING BURROWING RATS FROM CROP FIELDS

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ABSTRACT

The effectiveness of cow dung and poultry litter for controlling rats was evaluated in the wheat field at Wheat Research Centre, Dinajpur and poultry farm at Kapasia, Gazipur during January to May 2013 and 2014. Four different concentrations of cow dung and poultry littler solution i.e., 0%, 10%, 20% and 30% cow dung and poultry litter solution including untreated control were used for repelling burrowing rats. In wheat field 30% and 20% cow dung solution were found effective (65% success) for repelling rat. In poultry farm 70% success was observed at 30% poultry litter solution followed by 20% poultry litter solution (60% success) for repelling rat.

Keywords: Rat, repel, cow dung, poultry litter

Introduction

Rodents are the most successful and abundant mammal which occupied about one-third of the total mammalian population and can thrive in a wide range of climatic conditions and of habitats. Rats and other rodents are serious crop damaging vertebrate pests throughout the world (Brooks et al. 1990). In addition to crop damage, rodents undermine and weaken wooden structure and chew electrical and telephone cables(Marsh 1988). They are also the major pest in the storage and poultry farm as they attack the young birds and carry them away to their burrows.Rodents also disseminate different kinds of diseases in human and livestock including plague, rat bite fever, Leptospirosis, Salmonellosis, and Murin typhus etc (Gratz 1988).

Wheat is probably subjected to more damage from rats than any other pest. Tiller cutting by rats and hoarding of cut panicles into burrows leads to significantly lower yields of wheat in Bangladesh. The major rodent pest of wheat in Bangladesh is the lesser bandicoot rat, *Bandicota bengalensis*. It occupies communal burrows and can reach very high local populations densities (Aplinet al. 2003,Poche et al. 1982) assessed pre-harvest rat damage in wheat in Bangladesh and found that about 12% of the tillers was cut, amounting to an estimated about 77,000 tons of pre-harvest loss of wheat in Bangladesh.

Rodenticide baiting and trapping are the common approaches to control rodents but their efficacies are often affected due to behavioral avoidance of poison baits and traps (Prashadet al.1987, Prakash and Ghosh 1992, Reidinger 1995). Some farmer's view, cow dung and poultry litter can be used as an effective for controlling or repelling rat. In Bangladesh no study was conducted with cow dung and poultry litter to control or repel the rats from the crop field. So, this study was undertaken to evaluate a locally available low cost materials cow dung and poultry litter for rat management.

Materials and Methods

Experimental site and treatments: The experiment was conducted at Rajbari wheat field in Dinajpur and a poultry farm at Kapasia in Gazipur during January to May 2013 and 2014 where clear signs of rodent infestation were detected. There were four treatments in each experiment viz. 10%, 20% and 30% cow dung and poultry litter solution and the untreated control where no cow dung/ poultry litter was used. All the treatments were set with randomize complete block design with four replications. Only active burrows were considered for conducting this experiment. Burrows having clear symptom of rat inside with fresh soil in the opening were considered as active burrows. Ten active burrows for poultry litter in poultry farm and twenty active burrows for cow dung in wheat

field were used in this study. Before applying treatment all the active burrows were identified properly. Foot tracts activities were taken for two nights for both pre and post treatments operations.

Preparation of cow dung and poultry litter solution: For preparing 30%, 20% and 10% cow dung solution; 300g, 200g and 100g cow dung was separately mixed with 1 L of water. This mixture was blended for about 5 minutes and put in a water pot. The poultry litter solution was also prepared with the same procedure.

Application of treatment and data collection: Cow dung and poultry litter solutions were applied inside the burrow opening of active burrow system. Two liters of cow dung and poultry litter solution were applied by water pot in one active burrow system in each treatment. The prepared solution was applied in the evening and application was continued for consecutive two days. In case of control, active burrow systems were treated with pure drinking water. After applying the treatments, the entire burrows opening were closed by soil. After application of the treatments, rodent activities were observed up to seven days. The post treatment tile index data were taken. Efficacy of the treatment was judged on the basis of rodent activities based on active burrow opening and foot print on the tracking tiles.

Data analysis: Data were analyzed by analysis of variance and the mean values were separated byTukey HSDposthoc statistic. All the analyses were performed using IBM SPSS 21.1 software.

Results and Discussion

The effectiveness of cow dung and poultry litter differed significantly among the treatments for repelling rats from the wheat field. In case of cow dung, it revealed that the rodent controlling success differed significantly among the treatments. In active burrow count method, the rodent controlling efficacy for 30%, 20% and 10% cow dung solution was 65%, 65% and 45% respectively in wheat field (Table 1). Thirty and twenty per cent cow dung solution showed the highest success which was statistically identical with the treatments. Only 10% success was recorded in case of untreated control treatment where no

Table 1. Rodent controlling efficacy of different concentrations of cow dung solution by active burrow count method in wheat field

Treatments	Number of pre-treatment burrow	Post treatment active burrow	% Success over pre- treatment index
10% cow	20	11.0 ± 0.4b	45.0± 0.4b
20% cow	20	7.0 ± 0.4a	65.0± 0.4a
30% cow	20	6.8 ±0.8a	66.3± 0.8a
Control	20	18.0 ± 0.7c	10.0 ± 0.7c

Means within a column followed by the same letter are not differ significantly by Tukey HSD posthoc statistic ($p \leq 0.05$)

Table 2. Efficacy of cow dung for controlling rats by tracking tile count methods in wheat field

Treatments	Tile set (Number)	Pre treatment		Post treatment		% Reduction over pretreatment tile index
		Number of positive tile	% Positive tile	Number of positive tile	% Positive tile	
10% cow	40	39	97.5	19	47.5	52.5
20% cow	40	40	100.0	13	32.5	67.5
30% cow	40	39	97.5	12	30.0	70.0
Control	40	37	92.5	38	95.0	5.0

Table 3. Rat controlling efficacy of different concentrations of poultry litter by active burrow count method in poultry farm

Treatments	Number of burrow treated	Post treatment active burrow	%Ssuccess over pre- treatment index
10% poultry litter	10	6 b	40 b
20% poultry litter	10	4 ab	60 ab
30 % poultry litter	10	3 a	70 a
Control	10	9 c	10 c

Means within a column followed by the same letter are not differ significantly by Tukey HSDposthoc statistic ($p \leq 0.05$)

cow dung was used. More or less similar efficacy was observed in case of tracking tile count methods (Table 2). In case of poultry litter, it was also found effective against burrowing rat with 70% and 60% success recorded in 30% and 20% poultry litter solution respectively (Table 3).The result followed the same trends as the concentration of cow dung solution. When cow dung or poultry litter are applied in the burrows and all the burrow opening are closed in that case of cow dung or poultry litter decompose inside burrow. After decomposing cowdung inside the burrow creates a gas which is not suitable for rat to stay inside burrow.

The potential of cow dungas repellent effect against animal has not been reported previously. It is an indigenous method for rat control in India and Bangladesh. Raw material of cow dung has been selected based on experience, traditional knowledge and practice by ancestors (Duke et al. 2002) (Sharmaet al. 2017). Farmers used this cow dung solution for repelling rat from crop field. Cow dung contains plenty of Menthol, Ammonia, Phenol, Indol, Formalin and specifically its bacteriophage eradicate the pathogens and are a recognized disinfectant (Mohan and Ramaswamy 2007). The cow dung consists of 56.7 % methane (CH_4) and 54.3 % propane (C_3H_8)], while poultry litter consists of 22.9 % by volume of methane (CH_4), 17.4 % of propane (C_3H_8), 35.2% of ethyne (C_2H_2) and 24.5% by volume of ethane (C_2H_8)]. Also, the higher heating value of poultry litter than the cow dung (Oladeji 2013). All these chemical and gases are directly or indirectly responsible for repelling rat from rat burrow/hole. Cow dung solution has been used to repel thrips from rice field and also used to repel mosquitoes at Assam province in India (Deka et al. 2006).

In that case applying cowdung or poultry litter can be alternate options for rat control.The findings of the experiment could be used as an eco-friendly tool for integrated rodent management, which will be used as environmentally sound and cost effective technology for reducing crop damage from burrowing rats.

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