

Knowledge, attitudes and practices of farmers on rodent pests and their management in the lowlands of the Sierra Madre Biodiversity Corridor, Philippines

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ARTICLE INFO

Article history:

Received 16 March 2010

Received in revised form

27 September 2010

Accepted 8 October 2010

Keywords:

Rodent management

Pest

Crop damage

Farmers' beliefs

Rice

Coconut

ABSTRACT

A survey of the knowledge, attitudes and practices (KAP) of 100 rice farmers and 50 coconut farmers was conducted in the coastal lowland agro-ecosystems of the Sierra Madre Biodiversity Corridor, Luzon, Philippines to identify current rodent management practices and to understand the extent of rat damage and the attitudes of farmers to community actions for rodent management. Pests were most commonly listed as one of the three most important rice and coconut production constraints. Other major crop production constraints were typhoons and insufficient water. Farmers consider rats to be the major pest of coconut and of rice during the wet season rice crop, with average yield losses of 3.0% and 13.2%, respectively. Rice and coconut farmers practised a wide range of rodent management techniques. These included scrub clearance, hunting and trapping. Of the 42 rice farmers and 3 coconut farmers that applied rodenticides to control rodents, all used the acute rodenticide, zinc phosphide. However, only ten rice farmers (23.8%) applied rodenticides prior to the booting stage and only seven farmers (15.6%) conducted pre-baiting before applying zinc phosphide. The majority of farmers belonged to farmer organisations and believed that rat control can only be done by farmers working together. However, during the last cropping season, less than a third of rice farmers (31.2%) applied rodent management as a group. In order to reduce the impact of rodents on the farmers of the coastal lowlands of the Sierra Madre Biodiversity Corridor, integrated management strategies need to be developed that specifically target the pest rodents in a sustainable manner, and community actions for rodent management should be promoted.

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1. Introduction

In the Philippines, rodents are important pre-harvest pests of crops, causing significant yield loss and loss of livelihood among smallholder farmers. In rice production, the official level of pre-harvest losses due to rodents has been reported to be 1–5% (Singleton, 2003), although this estimate is questionable (Singleton et al., 2008). Yield losses due to rodents are often underestimated at the national level and up to 50% yield losses in rice have been reported in some regions of Luzon (Singleton, 2003). In coconut cultivation, another major crop of the Philippines, yield losses are

also significant and estimates have ranged from 2–65% (PCARRD, 1985; AICAF, 1996).

Traditional methods of rodent control in the Philippines include digging or flooding of burrows, trapping, and rat campaigns involving large numbers of people (Fall, 1977). However, these methods may be laborious and are not always reliable (PCARRD, 1985). As a consequence, the use of chemical rodenticides, including acute poisons and anticoagulants, is common (Sumangil, 1990). The disadvantage of using rodenticides is that they are potent vertebrate toxicants and when applied as a method of control for a pest rodent, non-target species of rodents are potentially at risk. In addition, acute poisons, which are poorly labelled in developing countries, present high risks to humans because there are no antidotes (Buckle, 1990).

The Sierra Madre Biodiversity Corridor (SMBC), stretching along the east of Luzon Island, is a region of biological importance due to its

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high diversity of wildlife. It is home to at least 15 species of rodents (Heaney et al., 1998), five of which occur in the agricultural lowlands of Aurora province (Stuart et al., in press). The principal agricultural rodent pest species in the lowland complex agro-ecosystems are the non-native *Rattus tanezumi* (Temminck) and *Rattus exulans* (Peale). Three native rodent species that also are present in these complex agro-ecosystems are the common Philippine forest rat, *Rattus everetti* (Gunther), the Striped earth-rat, *Chrotomys* spp. (Kellogg) and the large Luzon forest rat, *Bullimus luzonicus* (Thomas). The impact of rodent pests on the rural communities of the SMBC is unknown and a major concern for this biologically rich region is that the efforts by farmers to manage the rodent problem may have a negative impact on the endemic rodent fauna.

A survey of the knowledge, attitudes and practices (KAP) of farmers at the household level was conducted to identify current rodent management practices in coastal lowland agro-ecosystems of the SMBC and to understand the extent of rat damage and factors influencing the observed damage, the impact of rodents on the rural communities, and the attitudes of farmers to community actions for rodent management. Similar KAP surveys have been undertaken in Ethiopia (Yonas et al., 2010) and Myanmar (Brown et al., 2008). These KAP studies have identified priority habitats for studies of the population ecology of rodent pest species and highlighted issues of concern that should be addressed when developing rodent management strategies.

2. Methods

2.1. Study area and farmer survey

Aurora province, located on the mid-eastern coast of Central Luzon, covers the eastern portion of the SMBC. The majority of the province is mountainous and covered in forest, whereas 30% is coastal flatland used mainly for agriculture. Agricultural production is the primary industry of Aurora, involving over 50% of the population. The principal crops grown are rice and coconut, with 7300 ha devoted to rice cultivation and 23,900 ha planted with coconut.

There are two rice cropping patterns in Aurora; a dry season crop from May to October and a wet season crop from December to April. The climate, based on the Modified Corona's Classification Scheme of the Philippine Atmospheric Geophysical and Astronomical Service Administration (PAGASA), falls under Type IV climate and has rainfall distributed more or less evenly throughout the year. However, extreme rainfall events, such as typhoons that frequent the region, are most likely to occur between October and December.

A KAP survey was conducted involving 150 farmers in the municipalities of San Luis and Baler, Aurora (15° 73'N; 121° 56'E) (Fig. 1). One hundred rice farmers (5.4% of total rice farmers in San Luis and Baler) were randomly selected from 10 barangays (villages) with the number selected (range = 3–19) proportional to the size of the barangay (measured by the number of rice farmer inhabitants). In the municipality of San Luis, 50 coconut farmers (2.6% of total coconut farmers in San Luis) were randomly selected from seven barangays with the number from each barangay (range = 3–12) proportional to the number of families that were coconut farmers. Coconut farmers were not interviewed in the municipality of Baler.

Farmers were interviewed individually using a structured questionnaire. Prior to the survey, the questionnaire was pre-tested with a subset of local farmers to refine the questions and check whether they were appropriate. Each interview was conducted in Tagalog (the local language) by local government agricultural technicians and lasted approximately 30 min. The questionnaire was divided into four sections. The first two sections covered the socio-demographic characteristics of the farmer and their household, such as,

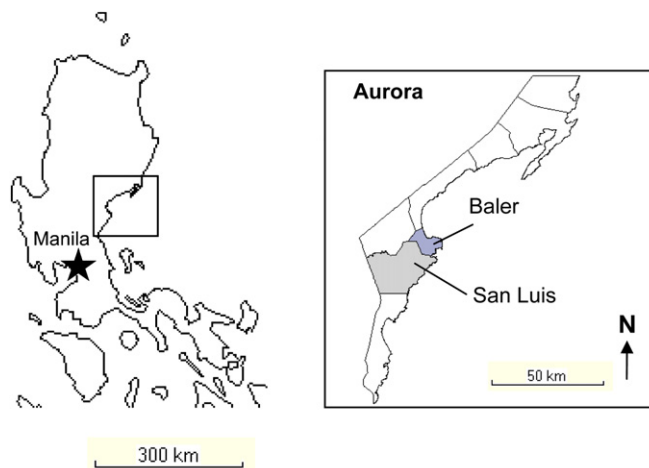


Fig. 1. Map showing the municipalities of Baler and San Luis within the province of Aurora, Luzon, northern Philippines [Source: Provincial Planning and Development Office, Aurora, 2007].

age, sex, education and income. The third section considered the farming structure, such as farm size and crop yield, crop production constraints and pest problems. The fourth section documented the perceptions of farmers with regard to rat damage and their beliefs and practices on rodent management. To assess their beliefs on rodent management, farmers were given a series of statements and asked to rate them on a five-point Likert scale. The five response options were; 1, Definitely not true; 2, In most cases not true; 3, May be true; 4, In most cases true; and 5, Always true. Surveys were conducted during November and December 2005.

2.2. Analysis

Although it is possible to analyse survey data consisting of a series of categorical questions using e.g. log-linear analysis, this would have required a much larger sample size than that collected in this study. Consequently, differences between (a) rice and coconut farmers and (b) between the two municipalities in farming practices and composition were compared using chi-squared tests. Independent variables differing significantly between farmer type and municipality were identified using a two tier process. First, all candidate variables were tested individually against the dependent variables. Candidate variables were: rodent management methods of farmers (alone/group), the use of rodenticides for control (yes/no), perception of damage in comparison to the previous year (higher/lower/same), perceived levels of rat damage (0%<1–5%/6–10%/>10%), sex (male/female), level of education (school/high school/college) and main occupation (farming/other). Variables which were significantly associated with farmer type or municipality were then ranked in order of highest to lowest significance. Second, further chi-squared tests were then used to examine the pair-wise association of provisionally selected variables in order of their ranking; where variables were significantly associated with one another, the lowest ranked variable was discarded. All analyses were conducted using SPSS v.17.0.

Loss of income due to rodent damage was calculated using the following equations:

$$\text{Potential yield (kg ha}^{-1}\text{; nuts ha}^{-1}\text{)} \\ = \frac{\text{Actual yield (kg ha}^{-1}\text{; nuts ha}^{-1}\text{)} \times 100}{100 - \text{Estimated yield loss (\%)}}$$

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