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NATIONAL RAT CONTROL PROGRAM IN THE PHILIPPINES

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ABSTRACT

Like any Asian country, the Philippines implements its rat control program through extension activities countrywide. Filipino farmers are convinced to participate in an innovative and effective rodent control other than the traditional practices of killing rats. The Government recommends continuous baiting throughout the rice cropping period. Different rat damage controls in other crops are also being investigated. Extension efforts are likewise extended to demonstrate various control programs that will help establish direct contact with farmers, and hence, convince their continuous participation. To achieve its extension goals, the Philippines considers training field technicians a critical need in its national rat control program.

INTRODUCTION

The Philippines, comprised of about 7,100 islands, extends over 1,600 kilometers between about five to 20 north latitude. The total land area is nearly 30 million hectares; about 65 percent of this area are occupied by the two largest islands, Luzon in the north and Mindanao in the south. Only 142 islands are larger than 1,500 hectares.

Approximately 10 million hectares are devoted to crop production. The country's major agricultural crops are rice, corn, coconut and sugarcane along with a variety of fruits and vegetables. Much of these crops' production takes place as small landholdings of five hectares or less.

Rodent damage to crops has always been a problem since it was first noted in the English literature before 1900.

PEST SPECIES AND DISTRIBUTION

The major pest species of cropland rodents are *Rattus rattus mindanensis*, *R. argentiventer*, *R. exulans*, and *R. norvegicus*. All four species can occur as separate populations in agricultural habitats; more commonly two or more species are found together, with one predominating. *R. r. mindanensis*, the country's major pest, occurs in most habitats, marsh, grassland, mountain forest areas, and frequently as a commensal in towns of all major islands. *Rattus argentiventer* predominates in ricefield areas of Mindanao and Mindoro. This species seems restricted to these islands' grassland or cropland habitats; it is probably not involved in coconut damage. *Rattus exulans* and *R. norvegicus* are considered minor crop pests except in a few localities. *Rattus exulans* is found throughout the country; it is plenty in Palawan ricefields. It commonly occurs in marginal lowland habitats or in upland crop areas, possibly due to competition with the larger species. *Rattus norvegicus* also occurs in the country's major islands, but most frequently in towns or port areas. Field populations have been found in Central Luzon's rice-growing areas as well as in Cebu and Panay.

NATURE AND EXTENT OF DAMAGE

Rodent damage patterns have been more extensively studied in rice than in other crops, although work is in progress to gain more knowledge of damage problems with corn, sugarcane, and coconut. In rice, damage occurs throughout the crop period, from seeding to harvest. Rats damage rice greatly during vegetative stages, when field cover is poor. The rate of rat's stem cutting generally declines during crop development. In mature rice, animals cut relatively few stems or panicles; they feed on grains.

National surveys were conducted from 1970 to 1972 with cut rice stems at harvest as an index of rodent damage. About 90 percent of 1,500 paddies examined during wet and dry seasons showed measurable damage ranging up to about 60 percent in each paddy. About seven percent of the paddies had more than 10 percent cut stems. Overall, damage measured by this index averaged 3.5 percent.

Subsequent surveys were made in 1974 to find out relative distribution of rodent damage in rice-producing provinces. Areas with severe rat damage or damage potential were estimated using a variety of methods like trapping, drives, farmer interviews, and field appraisals. Only areas with heavy rat infestations or with damage indices estimated as "above average" were considered. Twenty-four provinces had over 5,000 hectares of ricefields with high rat damage or damage potential; 21 from 1,000 to 5,000 hectares affected; and 25 provinces with less than 1,000 hectares. About 636,000 hectares or 40 percent of the total ricefields in the major rice-producing areas were judged to have potential heavy damage.

TRADITIONAL AND RECOMMENDED CONTROL METHODS

Filipino farmers have been using a variety of rodent control methods like their Asian counterparts. Typically, farmers are more concerned seeing dead rats than seeing reduced damage. This is a particular problem since rat damage is difficult to detect without carefully examining paddies until rice is nearly mature. Farmers traditionally control rats only when they see these pests during post-harvest period when field cover is eliminated. Drives, clubbing, digging burrows, and clearing vegetation are among the physical control techniques commonly used. Acute toxicants, particularly sodium monofluroacetate and later zinc phosphide, came into use in the mid 1950's under supervised post-harvest baiting programs known as "massive campaigns". Until today, farmers use zinc phosphide to bait farms during the crop period. In the early 1970's anticoagulant rodenticides were widely used. Several methods of application were likewise investigated. The government recommends continuous use of anticoagulant baiting throughout the crop period in rice (details of approaches used are discussed in these proceedings). Different rat damage controls in other crops are being investigated.

EXTENSION OF CONTROL APPROACHES

Several approaches have been tried during the past few years to convince farmers to participate in effective rodent control. There are still efforts to improve these approaches. It is perhaps too early to attempt to conclude which, if any, of the approaches tried or being tried will be most effective in establishing a self-sustaining program to protect crops from rodent damage countrywide. Demonstration programs or "pilot projects" were conducted in several parts of the country using relatively large areas (50 to 100 hectares or more) under the supervision of an agricultural technician. Project areas were gradually increased in size and incorporated in the government's regular supervised crop protection program. Added to this approach is the "managerial system" (also discussed in these proceedings) in which farmer group members contribute money to hire a fieldworker responsible for that group's rodent control.

The most widely-attempted approach involves using the single farm as a unit for rodent control closely coordinated with other crop protection practices. This is an important approach as rice farms increase with controlled irrigation and with new rice varieties of differing growth periods. At present, this approach is focused on farmers participating in the Masagana 99 rice production loan program. Farmers are allowed limited credit to purchase anticoagulant concentrates and bait material as recommended by the agricultural technician or extension agent supervising the production loan. Farmers under this loan program are required to follow recommended rice production practices, including rodent control, to continue their participation.

To operate all these techniques effectively, a corps of well-trained field technicians are required to establish frequent and direct contact with farmers. The Philippines has shown considerable progress in meeting this goal. Producing greater number of such manpower, specifically those trained in rodent damage control techniques, remains one of the most critical needs in an effort to protect the country's crops from rodent and other pest damage.

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REFERENCES

ALFONSO, P. J., and J. P. SUMANGIL. 1970. Control of ricefield rats, Chapter 15. Pages 204-211 *in* Rice Production Manual. University of the Philippines, College of Agriculture.

ANONYMOUS. 1977. Philippine rat control program (a country report). Plant Prot. News VI (2):58-59.

BARBEHENN, K. R., J. P. SUMANGIL, and J. L. LIBAY. 1973. Summary of Philippine rodents collected from February 1969 through December 1971. Rodent Research Center, College, Laguna, Philippines. 7 pp.

BARBEHENN, K. R., J. P. SUMANGIL, and J. L. LIBAY. 1973. Rodents of the Philippine croplands. Philipp. Agric. 56:217-242.

BARBEHENN, K. R., J. P. SUMANGIL, and J. L. LIBAY, and M. W. FALL. 1972. Distribution of agricultural rodent pests in the Philippines. Proc. Pest Control Counc. Philipp. 3:58-59.

BENIGNO, E. A. 1972. Estimating population parameters of the ricefield rat (*Rattus rattus mindanensis* Mearns). Unpublished M. S. Thesis, University of the Philippines at Los Baños. 49 pp.

BENIGNO, E. A., K. F. REDINGER, J. L. LIBAY, and F. F. SANCHEZ. 1976. Sustained baiting with anticoagulant rodenticides in cornfields and assessment of rat damage. Proc. 7th Natl. Pest Control Counc. Conf. 7:146.

BULLARD, R. W., and G. HOLGUIN. 1977. Volatile components of unprocessed rice (*Oryza sativa L.*). J. Agric. Food Chem. 25(1):99-103.

BULLARD, R. W., and S. A. SHUMAKE. 1977. Food base flavor additive improves bait acceptance by ricefield rats. J. Wildl. Manage. 41(2):290-297.

ESCALANTE, A. F. 1973. Baiting huts made of GI sheets. The Rat Fighter 8:18.

FALL, M. W. 1974. The use of red light for handling wild rats. Lab. Anim. Sci. 24:686-687.

FALL, M. W., G. A. HOOD, and J. W. DE GRAZIO. 1972. A vertebrate pest management workshop program in East Asia. Rodent Research Center, College, Laguna, Philippines. 27 pp. (mimeo)

FALL, M. W., and F. F. SANCHEZ. 1975. The Rodent Research Center. PANS. 21(2):206-209.

FALL, M. W., and R. R. WEST. 1973. Vertebrate pests in Southeast Asia. Proc. Pest Control Counc. Philipp. 4:18.

FALL, M. W., R. R. WEST, and A. L. KOLZ. 1975. Plastic fasteners for rapid attachment of radio transmitters to rats. Philipp. Agric. 56:263-266.

FERRER, L. S. 1973. A laboratory study on juvenile growth of the common ricefield rat. Unpublished M. S. Thesis, University of the Philippines at Los Baños. 48 pp.

_____. 1975. Growth of *Rattus rattus mindanensis*. Philipp. Agric. 59(1&2):37-42.

GUERRERO, R. D. III. 1970. The yield reduction of rice caused by mechanical and actual rat damage. Unpublished M. S. Thesis, University of the Philippines at Los Baños. 37 pp.

———. 1971. The effect of simulated rat tiller cutting on the yield of rice. Philipp. Agric. 54:439-447.

HOOQUE, M. M. 1972-1973. Notes on rodent pest affecting coconut. Philipp. Agric. 56(7&8): 280-289.

———. 1973. The toxicity of four anticoagulant rodenticides to *Rattus rattus mindanensis* Mearns. Unpublished M. S. Thesis, University of the Philippines at Los Baños. 27 pp.

HOOQUE, M. M., R. F. REDINGER, and J. L. LIBAY. 1976. Crown baiting in coconut trees using anticoagulant rodenticide to reduce rat damage. Proc. 7th Natl. Pest Control Counc. Conf. 7:148-149.

IRAL, P. T. 1977. Development of rodent control as practiced by the Philippine-German Crop Protection Programme. Plant Prot. News VI(2):29,32-33.

KOLZ, A. L., and R. E. JOHNSON. 1976. Coulometric recorder for timing and counting events in the field. J. Wildl. Manage. 40(2): 278-282.

KUEHNERT, G. 1976. Varietal preference on different bait materials by *Rattus r. mindanensis*. Plant Prot. News V(1):24-27.

———. 1976. "Binhi?" as bait. Plant Prot. News V(2&3):7-8.

———. 1977. Preservation of rodents and collection of data. Plant Prot. News VI(2):39-41.

KUENHNERT, G., and A.M. CORONEL. 1975. New trials on how to use phosphide (Zn_3P_2). Plant Prot. News IV(3&4):10-11.

KUEHNERT, G., and A. M. CORONEL. 1976. Comparison of five recommended anticoagulant rodenticides commonly used in the Philippines. Plant Prot. News V(4):49-55.

KURYLAS, H. 1974. One year of rat control in coconut plantations. Plant Prot. News III (10&11): 89-97.

KURYLAS, H. and P. IRAL. 1975. Field rat control — managerial type of operation. Plant Prot. News IV(3&4):46-55.

LAVOIE, G. K., G. C. ATWELL, F. N. SWINK, J. P. SUMANGIL, and J. L. LIBAY. 1971. Movement of the ricefield rat, *Rattus rattus mindanensis*, in response to flooding and plowing as shown by fluorescent bone labeling. Philipp. Agric. 54:325-330.

LAVOIE, G. K., F. N. SWINK, and J. P. SUMANGIL. 1971. Destruction of rice tillers by rats in relation to stages of rice development in Luzon. Philipp. Agric. 54:125-131.

LIBAY, J. L. and M. W. FALL. 1976. Observations on an exceptionally dense population of wild rats in marshlands. Kalikasan (Philipp. J. Biol.) 5:207-212.

MARGES, B. E. 1972. Reproduction and seasonal abundance of the ricefield rat (*Rattus rattus mindanensis* Mearns) at Siniloan, Laguna. Unpublished M. S. Thesis, University of the Philippines at Los Baños. 43 pp.

MARGES, B. E., E. A. BENIGNO, and P. J. ALFONSO. 1972. Studies on reproduction and movement of the ricefield rat (*Rattus rattus mindanensis*) at Siniloan, Laguna. Proc. Pest Control Counc. Philipp. 3:62-63.

MELCHOR, J. D. 1973. Pilot project Plaridel. The Rat Fighter 8:19-23.

DE LA PAZ, A. M. 1977. Damage appraisal on rice. Plant Prot. News VI(2):50.

PEREZ, R. 1973. Rat outbreak in Irosin non-project area severe; German field rat control project extended and. The Rat Fighter 7:30.

RAMILO, C. 1977. Central Luzon rat loss down to 1.6. Plant Prot. News VI(2):46.

REIDINGER, R. 1974. Recent activities at the Rodent Research Center. Plant Prot. News III (10&11): 98-99.

SANCHEZ, D. C. 1972. Acceptance of some common foods by the ricefield rats *Rattus rattus mindanensis* and *Rattus argentiventer* and its relation to selection of bait carriers. Proc. Pest Control Counc. Philipp. 3:60.

———. 1977. Principles of ecology in the control of field rodents. Plant Prot. News VI(2):50-51.

SANCHEZ, F. F. 1973. The Philippine Rodent Research Center. The Rat Fighter 7:29.

———. 1976. Rodents affecting food supplies in developing countries: problems and needs. FAO Plant Prot. Bull. 23(3/4):96-102.

SCHAEFER, J. 1975. Crop pains — crop losses. Views on the field rat situation in Philippine rice crops. Plant Prot. News. IV(3&4):12-14.

SHUMAKE, S. A. 1977. The search for applications of chemical signals in wildlife management. Pages 357-376 *in* D. Muller-Schwarze, ed. Chemical Signals in Vertebrates. Plenum Publishing Corp., New York.

———. 1978. Food preference behavior in birds and mammals. Pages 21-42 *in* R. W. Bullard, ed. Flavor Chemistry of Animal Foods. American Chemical Society, Washington, D. C.

SUMANGIL, J. P. 1969. The biology and control of field rats in the Philippines. Pages 204-211 *in* Production of Protein-rich Foods from local Sources. RDC, Centro Escolar University, Manila.

———. 1971. Burrows and breeding of ricefield rats in Cotabato, Philippines. Unpublished M. S. Thesis, Colorado State University. 38 pp.

———. 1972. Burrows and breeding of ricefield rats in Cotabato, Philippines. Proc. Pest Control Counc. Philipp. 3:61.

———. 1972-1973. The effects of rain and shower in the feeding activity of Cotabato field rats. Philipp. Agric. 56(7&8):267-273.

———. 1973. Preference of ricefield rats for some common cereal baits in grassland habitat. The Rat Fighter 8:27. (Abstr.)

———. The national rat control program. Proc. 7th Natl. Pest Control Counc. Conf. 7:95-97.

SUMANGIL, J.P., P.J. ALFONSO, and F. N. SWINK. 1969. Rat control recommendations for rice. Page 26 *in* The Philippines Recommends for Rice-1969. University of the Philippines, College of Agriculture.

SUMANGIL, J. P., P. J. ALFONSO, F. N. SWINK, and J. MORALES. 1970. More effective control of rats. Pages 32-33 *in* The Philippines Recommends for Rice-1970. Natl. Food Agric. Counc. Manila, Philippines.

SWINK, F.N., G.K. LAVOIE, G. C. ATWELL P. SUMANGIL, and A. M. DE LA PAZ. 1973. Preliminary comparisons of three baiting methods for Philippine ricefield rats. Philipp. Agric. 56:251-257.

TEMME, M. 1973. Movement studies of ricefield rats: *Rattus argentiventer*. Robinson and Kloss. The Rat Fighter 1(1-6):41-45.

———. 1973. A comparison of head-body and tail measures of *Rattus argentiventer* and *Rattus rattus mindanensis*. The Rat Fighter 7:31-36.

———. 1973. Damage surveys in coconut plantations. The Rat Fighter 8:25-26.

———. 1974. Observations on bait consumption of *Rattus r. mindanensis* in bait stations of different size and material. Plant Prot. News III(10&11):100-106.

THOMPSON, R. D., S. A. SHUMAKE, and R. W. BULLARD. 1972. Methodology for measuring taste and odor preference of rodents. Proc. 5th Vertebr. Pest Conf., Fresno, California, 5:36-42.

TIGNER, J. R. 1972. Seasonal food habits of *Rattus rattus mindanensis* (the Philippine ricefield rat) in Central Luzon. U.S. Dep. Inter. Bur. Sport Fish. Wildl. 66 pp. (mimeo)

WEST, R. R., and M. W. FALL. 1973. Some approaches for reducing rodent damage to growing rice. Pest Control Counc. Philipp. 4:18.

WEST, R. R., M. W. FALL, and E. A. BENIGNO. 1976. Reducing interactions among rats to improve bait acceptance. Philipp. Agric. 59(1&2):31-36.

WEST, R. R., M. W. FALL, and J. L. LIBAY. 1973. Field trial of multiple baiting with zinc phosphide to protect growing rice from damage by rats (*Rattus rattus mindanensis*). Proc. Crop. Sci. Soc. (Philipp.) 143-147.

WEST, R. R., M. W. FALL, and J. LIBAY. 1975. Tiller cutting behavior of rats in growing rice. Philipp. Agric. 59(1&2):27-30.

WEST, R.R., M.W.FALL, and J.L. LIBAY. 1976. Comparison of snap traps and tracking tiles for obtaining population indices of *Rattus rattus mindanensis* in the Philippines. Philipp. Agric. 59(9&10):379-386.

WEST, R. R., W. H. ROBINSON, A. M. dela PAZ. 1973. Weatherability of zinc phosphide-treated rice baits. Philipp. Agric. 56:258-162.

WEST, R. R., D. C. TOLENTINO, and D. C. SANCHEZ. 1972. Evaluation of aerial dispersal of zinc phosphide baits for rodent damage control. Proc. Pest Control Counc. Philipp. 3:62.

WURSTER, D. H. and G. C. ATWELL. 1973. A comparative chromosome study of *Rattus rattus mindanensis* and *Rattus argentiventer*. Philipp. Agric. 56:243-250.