

THE ADOPTION OF HIGH-YIELDING VARIETIES AND
FERTILIZER APPLICATION AMONG RICE
FARMERS IN TARAI, NEPAL

RAMESH L. KARNA

SUBMITTED TO THE FACULTY OF THE INSTITUTE OF
GRADUATE STUDIES, CENTRAL LUZON STATE
UNIVERSITY IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR
THE DEGREE OF

MASTER OF SCIENCE
(Rural Development)

MARCH, 1985

TABLE OF CONTENTS

| | PAGE |
|--|------|
| LIST OF TABLES | ix |
| LIST OF APPENDIX TABLES | xi |
| LIST OF FIGURES | xiii |
| ABSTRACT | xiv |
| INTRODUCTION | 1 |
| Statement of the problem | 3 |
| Objectives of the study | 4 |
| Hypotheses of the study | 5 |
| Importance of the study | 6 |
| Limitation of the study | 7 |
| REVIEW OF LITERATURE | 8 |
| Social factors related to adoption | 9 |
| Economic factors related to adoption | 10 |
| Diffusion factors related to adoption | 12 |
| Support facilities factors related to adoption | 13 |
| METHODOLOGY | 15 |
| Conceptual framework | 15 |
| Operational definition of terms | 21 |
| Place of the study | 25 |
| Selection of respondents | 27 |
| Collection of data | 27 |
| Methods of analysis | 28 |
| Levels of significance | 30 |
| RESULTS AND DISCUSSIONS | 31 |
| Socio-economic characteristics of respondents | 31 |
| Degrees of adoption of high-yielding varieties and fertilizer application | 36 |
| Rate of awareness and adoption of high- yielding varieties and fertilizer application | 38 |
| Relationship between adoption and selected variables of hypotheses | 45 |
| Evaluation and verification of hypotheses | 91 |
| After-the-study model of the adoption of HYVs and FA | 96 |
| Established channels of communication | 99 |

| | PAGE |
|--|---------|
| Most commonly planted high-yielding rice varieties | 101 |
| Sources of high-yielding varieties of rice seeds | 103 |
| Use of fertilizer and its sources | 105 |
| Problems of the respondents regarding adoption of high-yielding varieties and fertilizer application | 113 |
| Suggestions of the respondents regarding improvement of the adoption of high-yielding varieties and fertilizer application | 115 |
| SUMMARY, CONCLUSIONS AND IMPLICATIONS AND RECOMMENDATIONS | |
| Summary | 118 |
| Conclusions and implications | 130 |
| Recommendations | 133 |
| LITERATURE CITED | 135 |
| APPENDIX | 139 |
| INTERVIEW SCHEDULE (QUESTIONNAIRE) | 160 |

LIST OF TABLES

| TABLE | | PAGE |
|-------|--|------|
| 1 | Age of the respondents | 31 |
| 2 | Educational attainment of the respondents | 32 |
| 3 | Family size of the respondents | 33 |
| 4 | Farming experience of the respondents | 34 |
| 5 | Size of rice farm of the respondents | 35 |
| 6 | Income from rice farm of the respondents | 36 |
| 7 | Distribution of the respondents by degrees of adoption of HYVs and FA | 37 |
| 8 | Rate of adoption of HYVs and FA | 39 |
| 9 | Intercorrelation matrix (correlation coefficients) of adoption of HYVs and FA and quantitative independent variables | 53 |
| 10 | Results of multiple regression analysis predicting adoption of HYVs and FA with quantitative variables as predictors | 57 |
| 11 | Results of ANOVA of adoption of HYVs | 58 |
| 12 | Results of ANOVA of adoption of FA | 59 |
| 13 | Chi-square analysis of degrees of adoption of HYVs and tenurial status | 61 |
| 14 | Chi-square analysis of degrees of adoption of FA and tenurial status | 62 |
| 15 | Chi-square analysis of degrees of adoption of HYVs and cost of input (seeds) | 65 |
| 16 | Chi-square analysis of degrees of adoption of FA and cost of fertilizer | 66 |
| 17 | Chi-square analysis of degrees of adoption of HYVs and information from neighbors | 68 |

| TABLE | | PAGE |
|-------|---|------|
| 18 | Chi-square analysis of degrees of adoption of FA and information from neighbors | 69 |
| 19 | Chi-square analysis of degrees of adoption of HYVs and contact with extension workers | 72 |
| 20 | Chi-square analysis of degrees of adoption of FA and contact with extension workers | 73 |
| 21 | Chi-square analysis of degrees of adoption of HYVs and radio agriculture program | 75 |
| 22 | Chi-square analysis of degrees of adoption of FA and radio agriculture program | 76 |
| 23 | Chi-square analysis of degrees of adoption of HYVs and farm demonstration | 79 |
| 24 | Chi-square analysis of degrees of adoption of FA and farm demonstration | 80 |
| 25 | Chi-square analysis of degrees of adoption of HYVs and irrigation facility | 82 |
| 26 | Chi-square analysis of degrees of adoption of FA and irrigation facility | 83 |
| 27 | Chi-square analysis of degrees of adoption of HYVs and credit facility | 85 |
| 28 | Chi-square analysis of degrees of adoption of FA and credit facility | 86 |
| 29 | Chi-square analysis of degrees of adoption of HYVs and marketing facility | 89 |
| 30 | Chi-square analysis of degrees of adoption of FA and marketing facility | 90 |

LIST OF APPENDIX TABLES

| TABLE | | PAGE |
|-------|--|------|
| 1 | Cumulative percentage of awareness and adoption of HYVs and FA | 140 |
| 2 | Frequency distribution of age groups and degrees of adoption of HYVs | 141 |
| 3 | Frequency distribution of age groups and degrees of adoption of FA | 142 |
| 4 | Frequency distribution of educational attainment and degrees of adoption of HYVs | 143 |
| 5 | Frequency distribution of educational attainment and degrees of adoption of FA | 144 |
| 6 | Frequency distribution of size of family and degrees of adoption of HYVs | 145 |
| 7 | Frequency distribution of size of family and degrees of adoption of FA | 146 |
| 8 | Frequency distribution of farming experience and degrees of adoption of HYVs | 147 |
| 9 | Frequency distribution of farming experience and degrees of adoption of FA | 148 |
| 10 | Frequency distribution of size of rice farm and degrees of adoption of HYVs | 149 |
| 11 | Frequency distribution of size of rice farm and degrees of adoption of FA | 150 |
| 12 | Frequency distribution of income from rice farm and degrees of adoption of HYVs | 151 |
| 13 | Frequency distribution of income from rice farm and degrees of adoption of FA | 152 |
| 14 | Established channels of communication | 153 |
| 15 | Most commonly planted high-yielding rice varieties | 154 |

| TABLE | | PAGE |
|-------|---|------|
| 16 | Sources of high-yielding varieties of rice seeds | 155 |
| 17 | Methods of fertilizer application in rice crop | 155 |
| 18 | Fertilizer applied as basal in rice crop | 156 |
| 19 | Fertilizer applied as topdressing | 156 |
| 20 | Sources of inorganic fertilizers | 157 |
| 21 | Application of organic fertilizer | 157 |
| 22 | Problems of the respondents regarding adoption of HYVs and FA | 158 |
| 23 | Suggestions of the respondents regarding improvement of the adoption of HYVs and FA | 159 |

LIST OF FIGURES

| FIGURE | | PAGE |
|--------|---|------|
| 1 | Conceptual model of the adoption of HYVs and FA | 19 |
| 2 | Cumulative rate of awareness and adoption of high-yielding varieties | 41 |
| 3 | Cumulative rate of awareness and adoption of fertilizer application | 42 |
| 4 | Annual rate of adoption of high-yielding rice varieties | 43 |
| 5 | Annual rate of adoption of fertilizer application | 44 |
| 6 | After-the-study model of the adoption of HYVs and FA | 98 |
| 7 | Established channels of communication and sources of information regarding rice cultivation | 100 |
| 8 | Most commonly planted high-yielding rice varieties | 102 |
| 9 | Sources of high-yielding varieties of rice seeds | 104 |
| 10 | Methods of fertilizer application in rice crop | 106 |
| 11 | Fertilizer applied as basal in rice crop | 108 |
| 12 | Fertilizer applied as topdressing | 109 |
| 13 | Sources of inorganic fertilizer | 111 |
| 14 | Application of organic fertilizer | 112 |

ABSTRACT

KARNA, RAMESH L., Central Luzon State University, Muñoz, Nueva Ecija, Philippines, March, 1985. THE ADOPTION OF HIGH-YIELDING VARIETIES AND FERTILIZER APPLICATION AMONG RICE FARMERS IN TARAI, NEPAL.

Major Professor: Dr. Romeo L. Saplaco

The study tried to determine the relationship of some selected variables which influenced the farmers' acceptance of high-yielding varieties (HYVs) and fertilizer application (FA). It involved three hundred farmer-respondents from six village panchayats of Tarai. It had the following objectives: (1) to describe socio-economic characteristics of respondents; (2) to identify social, economic, diffusion, and support facilities factors associated with the adoption of HYVs and FA in rice production; (3) to determine the degrees and rate of adoption of said cultural practices; (4) to determine the relationship of selected variables to the adoption of HYVs and FA; and (5) to suggest communication channels suited to Nepalese (Tarai) conditions for rice production.

Data showed that farmer-respondents were males. Their average age was 40.66 years. The average rice farm size was 3.28 hectares. The 57.67 per cent of respondents adopted HYVs while 62 per cent had been applying fertilizer. The estimated

rate of adoption of HYVs was 0.478 per year; while the adoption rate for FA was 0.624.

Results revealed that variables such as age, educational attainment, size of family, size of rice farm, income from rice farm, tenurial status, cost of inputs, information from neighbors, contact with extension workers, radio agriculture programs, farm demonstrations, irrigation facility, credit facility, and marketing facility were highly associated with the adoption of HYVs and FA. On the other hand, farming experience did not show significant relationship with the adoption of HYVs and FA.

Results further showed that the communication channels in rice cultivation were extension workers, neighbors, radio agriculture programs, Pradhan panchas (head of village panchayat), and friends and relatives.

Based on findings and observations made, the following recommendations are given: (1) a system of a continuing supply of farm information to extension workers for regular dissemination to farmers should be developed; (2) adaptive research should be conducted on the farmers' socio-economic environment and translated into a form more understandable to them; (3) facilities such as irrigation system, timely provision of inputs, superior quality of seeds, crop insurance, and crop protection programs need careful study for whatever implementation they deserve; and (4) related studies on psycho-social, cultural, political, institutional, and technological variables as these

influencing adoption of particular farm practices should be done in the other regions of the country.

LITERATURE CITED

- ALCOBER, D.L. 1978. "Innovative performance of coconut farmers in province of Southern Leyte, Philippines." Unpublished Ph.D. dissertation. University of the Philippines at Los Baños, College, Laguna.
- ANGELES, HONORATO L., ROMEO B. GAVINO, and ARTURO T. CUBOS. 1983. Community management irrigation system. Central Luzon State University, Muñoz, Nueva Ecija, Philippines.
- ANIEVAS, C.T. 1975. A study of copra marketing practices on the farm level in Surigao del Norte. 1954-1964. An abstract of the results of research projects. UPLB, College, Laguna.
- BARNETT, W.E. and SELZ C. MAYO. 1952. North Carolina Agriculture Extension Services. Progress Report No. 14. June.
- BATTAD, F.A. 1973. "Factors associated with the adoption of rice technology in Cotabato." Unpublished Ph.D. dissertation. UPLB, College, Laguna.
- BLACKMORE, J., R.M. DIMIT, and E.L. BAUM. 1955. Test-demonstration farms and the spread of improved farm practices in Southwest Virginia, Knoxville: Tennessee Valley Authority Agricultural Economics Branch, Division of Agricultural Relation. Report No. 55, p. 3. June.
- BUREAU OF AGRICULTURE ECONOMICS. 1946. Attitudes of rural people toward radio service. A nationwide survey of farm and small-town people. Washington: U.S. Department of Agriculture.
- CENTRAL BUREAU OF STATISTICS. 1982. Statistical pocketbook. Kathmandu, Nepal.
- CHU, E.G. 1973. "High-yielding rice varieties at the crossroads: three post-trial alternative decisions among farmers." Unpublished M.S. thesis. UPCA, College, Laguna.
- COPP, J.H. and M.L. SILL. 1958. "The function of information sources in the farm practice adoption process." Rural Sociology Journal No. 23, June. pp. 146-147.
- COVAR, P.R. 1960. The Masagana/Margate System of planting rice: a study of agricultural innovations. UP CDRC Study Service No. 5. p. 90.

- CRUZ, T.S. 1981. "A communication analysis of rice-fish technology dissemination and utilization." Unpublished Ph.D. dissertation. UPLB, College, Laguna.
- DEROGONGAN, M.B. 1973. "The rice production programme in a Maranaw community." Unpublished Ph.D. dissertation, UPCA, College, Laguna.
- DIMAANO, C.M. and A.M. de GUZMAN. 1966. Corn-rice farmers response to changes in cropping pattern. A Case Study. Mimeographed.
- FLIEGEL, F.C. 1956. "A multiple correlation analysis of factors associated with adoption of farm practices." Rural Sociology Journal, Vol. 21. pp. 285-292.
- GRILICHES, EVI. 1962. "Profitability versus interaction: another false dichotomy." Rural Sociology Journal. Vol. 27 (September). pp. 327-330.
- ISADA, D.T. 1973. "The impact of corn production kits in selected corn priority provinces." Unpublished M.S. thesis. UPCA. College, Laguna.
- JAIMÉ, R.A. 1971. "The diffusion and adoption of some recommended practices in swine production in Laguna, Philippines." Unpublished M.S. thesis. UPCA, College, Laguna.
- JULIANO, P.A. 1977. "Farmers characteristics, adoption of recommended rice technology and tenure status among Laguna farmers." Unpublished Ph.D. dissertation. UPLB, College, Laguna.
- LAMUCHO, V.S. 1980. "Communication needs of households in the three selected barrios of Nueva Ecija." Unpublished M.S. thesis. Philippine Normal College.
- LIONBERGER, H.F. 1960. Adoption of new ideas and practices. Summary of the research dealing with the acceptance of technological change in agriculture with implication for action in facilitating such change. The Iowa State University Press. Ames, Iowa. p. 105.
- LU, A.Y. 1968. "Some socio-economic factors affecting the implementation at the farm level of rice production programme in Philippines." Unpublished Ph.D. dissertation. UPCA, College, Laguna.

- MADIGAN, F.C. 1968. The farmer said no. Second Printing. Community Development Research Council. University of the Philippines.
- MARSH, C.P. and A.L. COLEMAN. 1955. "The relation of farmer characteristics to the adoption of recommended farm practices in connection with project of Kentucky agricultural experiment station." Rural Sociology Journal. Vol. 20, No. 3-4. Table 1. p. 290.
- MARZAN, E. JR. G. 1981. "Socio-economic factors and marketability of carabeef in Central Luzon." Unpublished Ph.D. dissertation, Kansas State University, Manhattan, Kansas.
- MODE, ELMER B. 1961. Elements of statistics. Prentice Hall, Inc. Englewood Cliffs, N.J. pp. 202-218.
- OPLER, M. and D.S. RUDYA. 1951. "Economic, political and social change in a village in North Central India." Human organization 2 as cited by Katz, Eliher 1961. "Concepts and methods in the analysis of innovations and social change," Development Research Digest. National Planning Association. Washington, D.C. U.S.A. 2(4):45.
- PAHUD, S.L. 1969. "Some factors associated with the adoption of recommended rice practices." Unpublished M.S. thesis. UPCA, College, Laguna.
- PAMPEL, F. JR. and J.C. VAN ES. 1977. "Environmental quality and issue of adoption research." Rural Sociology Journal. Vol. 42. (Spring). pp. 57-71.
- PARKUM, K.H. 1967. "An analysis of the relationship between selected social and economic characteristics and membership in farm organization." Unpublished M.S. thesis. University of Wisconsin, Madison, Wisconsin.
- PASCUAL, M.P. 1971. "The adoption of some recommended corn production practices among corn farmers in Leyte." Unpublished M.S. thesis. UPCA, College, Laguna.
- RIVERA, F.T. 1980. "The production consumption behavior of farmer-cultivar households in six Nueva Ecija barrios." Unpublished Ph.D. dissertation. UPLB, College, Laguna.
- ROGERS, E.M. 1960. Social change in rural society. "A textbook in rural sociology." Appleton-Century Crofts, Inc. U.S.A. pp. 396-422.

- ROGERS, E.M. and F.F. SHOEMAKER. 1971. Sociology in rural society. Appleton-Century Crofts, Inc. New York.
- ROSE, R.L. 1982. "Communication flow and utilization of agricultural engineering technology in two rice-farming communities of Nueva Ecija." Unpublished Ph.D. dissertation, UPLB, College, Laguna.
- SLOCUM, W.L. 1962. Agricultural Sociology. "A study of sociological aspects of American farm life." Harper and Brothers Publishers, New York. pp. 197-211.
- THE RURAL SOCIOLOGICAL SOCIETY. 1952. Sociological research on the diffusion and adoption of new farm practices. Report of the subcommittee on the diffusion and adoption of farm practices. Lexington: Kentucky Agr. Exp. Station, RS-2 June 1952.
- VILLAVIZA, Q.N. 1974. "Socio-economic factors associated with the spending behavior of lowland rice farmers." Unpublished Ph.D. dissertation, UPLB, College, Laguna.
- WILKENING, E.A. 1955. Informal sources important in the acceptance and use of fertilizer in Iowa, TVA, Division of Agriculture in cooperation with Iowa Agricultural Extension Services. Report No. 1, p. 55.