EFFECTS OF LIME AND PHOSPHORUS APPLICATION ON THE PRODUCTION OF MUNGBEAN INTERCROPPED WITH CORN UNDER ACID SOIL

DUMRONGSAK CHANLOY

Submitted to the Faculty of the Institute of Graduate Studies, Central Luzon State University, Munoz, Nueva Ecija, Philippines, in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE
(Crop Science-Agronomy)

DECEMBER 1991

This thesis entitled, EFFECT OF LIME ANMD PHOSPHORUS APPLICATION ON THE PRODUCTION OF MUNGBEAN INTERCROPPED WITH CORN UNDER ACID SOIL, prepared and submitted by DUMRONGSAK CHANLOY in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE (Crop Science-Agronomy), is hereby accepted.

GUILLERMO C. FALLON
Member, Advisory Committee

3 Feb '92
Date Signed

TEODIMO C. AGANON
Member, Advisory Committee

2-4-92
Date Signed

LUN G. MATEO
Chairman, Advisory Committee

Feb 4, 1992
Date Signed

Accepted as partial fulfillment of the requirements for the degree of MASTER OF SCIENCE (Agronomy - Crop Science).

NATHANIEL V. LAPITAN
Dean

2-10-92
Date Signed

BIOGRAPHICAL SKETCH

The author was born on May 27, 1955 in Patumtani province in Central part of Thailand. He is the youngest of the seven children of Mr. Paisarn Chanloy and Mrs. Mrien Chanloy.

He finished his elementary education at WatPolien and Watchaiyasitawat school in 1968 and his secondary education at Patumvilai School, Amphoe MuengPatumtani, Patumtani province in 1971. He studied in the Vocational Agricultural School, Chonburi Agriculture College, Chonburi Province in southeastern Thailand and finished his secondary vocational agriculture at Patumtani agriculture college in 1976. He took up higher education at the Faculty of Agricultural Technology, KingMongkut's Institute of Technology Chaokuntaharn campus, Lardkrabang, Bangkok. He graduated with the degree of Bachelor of Science in Agriculture major in Technology Plant Production in 1978.

In March 1978, he was employed as extension officer at the Soil and Fertilizer Sub-Division at Department of Agriculture Extension, Agricultural Ministry at Bangkhen, Bangkok.

In 1986, he was appointed as subject matter specialist by the Director of the General Department of Agriculture Extension, after which he transferred to the Burirum sericulture Center No. 3 Burirum province Northeastern Thailand. Then he transferred to the Sericulture Sub-Division of the Department of Agriculture Extension in 1989.

In 1990, he was granted by the Department of Agricultural Extension a study leave to pursue masteral degree in crop science at the Central Luzon State University,(CLSU) Munoz, Nueva Ecija, Philippines. He was elected Vice-President of the Thai Student Association during his stay in CLSU.

ACKNOWLEDGMENT

The author wishes to express his heartfelt thanks and sincere gratitude to the following who contributed to the success of this study;

Professor Lun G. Mateo, Chairman, Advisory Committee for his suggestions and comments for the improvement of this manuscript;

Dr. Guillermo C. Rillon and Dr. Teotimo M. Aganon, members of his Advisory Committee for their unrelenting assistance to improve the manuscript; Dr. Miguel L. Aragon, Dean, College of Agriculture; Professor Danilo T.Eligio, IGS Chairman of the Examining Committee and Professor Casimiro M.Arceo, IGS representative for their contribution in the improvement of the manuscript.

Sincere appreciation and special thanks are extended to Professor Federico O. Perez, Chairman of Soil Science; Professor Clarita P. Aganon; Professor Jaime R. Quilantang; Mrs. Nenette E. dela Cruz; Mrs. Edna P. Malamug, and Mr. Victorio L. de Vera for their unselfish assistance in the research process;

Dr.Estefania W. Kollin and Dr. Monica F. Quilantang for painstakingly editing the manuscript; and Mr. Dalmacio B. Florendo for the help he extended to the author.

Heartfelt gratitude is likewise extended to Mr. Narong Meenanada, Director General Agricultural Extension; Mr. Ananda Dalodom, Deputy Director general of Agricultural Extension; Mr. Udom Dechmani, Deputy Director General of Agricultural Extension; Mr. Choonhathep Pongsoiyphetch Deputy Director General of Agricultural Extension; Mr. Somchai Sukontasing, Director of Plant Extension Division; Department of Agricultural Extension; Mrs. Pornthip Sukontasing, Head of Sericulture Sub-division Department of Agricultural extension; Mr. Mongkol Chanpen, Head of Soil and Fertilizer Subdivision; Dr. Dusit Chitanoon, Chief of Soil and Fertilizer Research Department of Agricultural Extension, Mr. Sawat Bungkai, Head of Burirum Sericulture Center No. 3; Mr. Ouichai Mongkolpitaya subject matter specialist, Burirum Sericulture Center No. 3; Burirum Province, Department of Agriculture extension, for their kind recommendation which facilitated the author's trip to the Philippines for further studies.

Special thanks and gratitude are extended to Mr. Supat Piyarom, Mr. Somkid Nuchphan, Mr. Suchat Porung, Mr. Saree Mookda, Mr. Leng Tekseng, Cambodian student, Mr. Maung Pye Nyein, Burma student; and all Thai students at CLSU, who helped the author during the conduct of the experiment.

Finally, the author expresses his deepest gratitude to his parents, brothers, sisters, relatives, and friends for their moral support, their understanding and encouragement which they him enjoy while he was in the Philippines.

DUMRONGSAK CHANLOY

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDIX TABLE

ABSTRACT

CHANLOY, DUMRONGSAK, Institute of Graduate Studies, Central Luzon State University, Muñoz, Nueva Ecija, Philippines, October 1991. EFFECTS OF LIME AND PHOSPHORUS APPLICATION ON THE PRODUCTION OF MUNGBEAN INTERCROPPED WITH CORN UNDER ACID SOIL.

Adviser: **Prof. Lun G. Mateo**

The study was conducted in concrete boxes with acid soil as the medium for crop growth and development. It was conducted to determine the agronomic and yield performance of mungbean and corn grown as monocrop and intercrop with and without the addition of lime and phosphorus. Likewise, its residual effect on mungbean was evaluated.

Seed yield of mungbean was significantly reduced when it was intercropped with corn regardless of $CaCo_3$ and P application. However, it significantly increased the intercropped mungbean seed yield with and without their application when applied P with $CaCo_3$ and P Lime. On the other hand, application of P on intercropped mungbean gave comparable yield with that of the control (no lime and no P application). As far as

monocrop mungbean is concerned, it yielded comparably with and without P application. Likewise, liming with and without P application followed the same trend but significantly gave higher yield than the control.

Corn yield, on the other hand, significantly increased when intercropped with mungbean and applied with lime but without P application. Liming with or without the addition of P improved corn productivity as evidenced by the significant increase in yield over unlimed soil.

All the yield characters of mungbean and corn were significantly influenced by the treatments imposed except the weight of 1000 seeds of mungbean which was most likely attributed to the genetic make-up of the variety used.

Plant height of mungbean either at 20 DAP, 45 DAP and 60 DAP was likewise affected by the different treatments with six tons $CaCo_3$/ha plus 60 kg P_2O_5/ha giving the tallest plants.

Corn height, however, was affected only by lime and P application at 20 DAP and 45 DAP. Comparable plant height was obtained at 60 DAP.

In terms of residual effect, significant variations existed among treatments on plant height, nodule count as well as herbage yield at 54 DAP.

LITERATURE CITED

Abellanosa, A.L. 1981 The effect of population density and spatial arrangement on the productivity of maize and mungbean intercrop. Unpulished M.S. thesis, UPLB, College Laguna. Philippines.

Brooks, C.O.., J.H. Bouton and M.N. Summer. 1982. Alfalfa Medicago sativa ,in highly weathered acid soils. 3. the effects of seeding selection in an acid soil on alfalfa growth at drying levels of P and lime. Plant Soil. No 65(1).

De Groot, W. 1980. Density of dry beans interplanted with maize. Intercropping Proceedings. Dept. of Crop Science, Facultty of Agriculture, Forestry and Vet. Sci. Univ. of Dar es Salaam, Morogoro, Tanzania.

Enwezor, W.O. 1977. Soil testing for phosphorus - in some Nigerian soil. 2. Prediction responces to phosphate application for soils of southestern Nigeria. J. Soil Sci. 123.

Farmis, M.P. W.., M.E. summer, C.O. Plank and W.S. Letch. 1980. Exchangeable aluminum and pH as indicators of lime requirements for corn Soil Sci. Soc. Am. J. 44.

Hadad, K.S. and C.T. Valdor. 1982. Effect of parent material, natural available soil boron, and applied boron and lime on the growth and chemical composition of luceme of some acid soils of Central Tablelands of New South Wales, Aust. J. Exp. Agric. Ani. Hush. 22.

Hassan, M.N. 1980. Intercropping under marginal rainfall conditions in Kenya. Intercropping Proceedings edited by C.L. Kashawani and B.J. Ndunguru. Dept. of Crop Science, Col. of Agric. Forestry and Vet. Science. University of Dar es Salaam, Morogoro, Tanzania.

Holford, I.C.R. 1983. Effect oflime and phosphate sorption characteristics and exchangeable and soluble phosphate in fifteen acid soils of Aust. J. Soil Res. 21.

Livesque, M.P. and S.P. Mather. 1983. Effect of Liming on yield and nutrient concentration of seed canary grass grown in two peat soils. Can. J. Soil Sci. 63.

Marasigan, W.S. 1983. Strip cropping can raise the income of corn and mungo farmers. Greenfields. New Horizons in Agriculture.

May, K.W. and R. Misangu. 1980. Some observations on the effects of plant arrangements for inter-cropping. Intercropping Proceeding. Dept. of Crop Science, Faculty of Agric., Forestry and Vet-Science, Univ. of Dar es Salaam, Moroqoro, Tanzania.

Mingel, K. 1983. Responses of various crop species and cultivar to fertilizer application. Plant and Soil. 72:305-319.

Probert, M.E. 1980. Growth response to various calcium sources in yellow earth soil with low status. Austt. J. Exp. Agric. Ani. Husb. 20.

Rhue, R.D. and D.R. Hensel. 1983. The effect of lime on the availability of residual phosphorus and its extractability. Soil Sci. Soc. Am. J. 47.

Rowe, B.A. 1982. Effect of limestone on pasture yields and the pH of two Krashozeme Tasmanis.

Saigusa, M.,.S. Shoji and T. Takhashi. 1980. Plant root growth in acid andosols from northeastern Janan. 2. Exchange acidity as a realistic measure of aluminum toxcity potential. Journal of Soil Science. 130:242-251.

Sinyth, J.J. and F.A. Janchez. 1980. Effect of lime, silicate and phosphorus application to an oxisol on phosphorus sorption and iron retention. Soc. Sci. Soc. Am. J. 44.

Timmer, V.R. 1985. Response of a hybrid popular clove to soil acidification and liming. Can. J. Soil Sci. 65:727:735.

Toledo, S.F. 1983. Productive potential of corn intercropped with mungbean and cowpea. TCA. Research Journal. IV, Jan-Aug. Nos.1 and 2.

Yoshida, S. 1981. Fundamentals of Rice Crop Science. IRRI, Los Banos, Laguna, Philippines Science. 130:242-251.