



IN THE NAME OF ALLAH, THE COMPASSIONATE,
THE MERCIFUL.

DEDICATION



**DEDICATED TO THE UNFATHOMABLE
DEPTHS OF LOVES AND EVER
STRENGTHENING PRAYERS OF MY PARENTS
AND ALL FAMILY MEMBERS**



**RICEBEAN [*Vigna umbellata* (THUNB) OWHI AND OHASHI]
PRODUCTIVITY AS INFLUENCED BY VARIOUS
AGRO-MANAGEMENT PRACTICES**

By

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CONTENTS


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CHAPTER	TITLE	PAGE
I	INTRODUCTION-----	1
II	REVIEW OF LITERATURE-----	7
III	MATERIALS AND METHODS-----	37
IV	RESULTS AND DISCUSSION-----	53
V	SUMMARY-----	141
	LITERATURE CITED-----	147

LIST OF TABLES

TABLE	TITLE	PAGE
1	Physical and chemical analysis of experimental soil	39
2	Number of plants m^{-2} of ricebean as affected by planting pattern and stand density	54
3	Plant height (cm) of ricebean as affected by planting pattern and stand density	56
4	Number of pods per plant as affected by planting pattern and stand density	58
5	1000-grain weight (g) of ricebean as affected by planting pattern and stand density	62
6	Biological yield ($kg\ ha^{-1}$) of ricebean as affected by planting pattern and stand density	65
7	Grain yield ($kg\ ha^{-1}$) of ricebean as affected by planting pattern and stand density	67
8	Leaf area index of ricebean as affected by planting pattern and stand density	70
9	Crop growth rate of ricebean as affected by planting pattern and stand density	72
10	Net assimilation rate ($gm^{-2}\ d^{-1}$) of ricebean as affected by planting pattern and stand density	74
11	Harvest index (%) of ricebean as affected by planting pattern and stand density	76
12	Grain protein content (%) of ricebean as affected by planting pattern and stand density	79
13	Number of pods $plant^{-1}$ of ricebean as affected by different nitrogen and phosphorus applications	84
14	Number of seeds pod^{-1} of ricebean as affected by different nitrogen and phosphorus applications	87

TABLE	TITLE	PAGE
15	1000-grain weight of ricebean as affected by different nitrogen and phosphorus applications	91
16	Biological yield of ricebean (kg ha ⁻¹) as affected by different nitrogen and phosphorus applications	92
17	Grain yield of ricebean (kg ha ⁻¹) as affected by different nitrogen and phosphorus applications	94
18	Harvest index (%) of ricebean as affected by different nitrogen and phosphorus applications	97
19	Leaf area index of ricebean as affected by different nitrogen and phosphorus applications	99
20	Crop growth rate (g m ⁻² d ⁻¹) of ricebean as affected by different nitrogen and phosphorus applications	100
21	Net assimilation rate (g m ⁻² d ⁻¹) of ricebean as affected by different nitrogen and phosphorus applications	102
22	Grain protein content (%) of ricebean as affected by different nitrogen and phosphorus applications	104
23	Number of plants m ⁻² of maize as affected by different maize-ricebean intercropping systems	106
24	Plant height of maize (cm) as affected by different maize-ricebean intercropping systems	107
25	Biological yield of maize (kg ha ⁻¹) as affected by different maize-ricebean intercropping systems	111
26	Grain yield of maize (kg ha ⁻¹) as affected by different maize-ricebean intercropping systems	112
27	Harvest index (%) of maize as affected by different maize-ricebean intercropping systems	115
28	Crop growth rate (g m ⁻² d ⁻¹) of maize as affected by different maize-ricebean intercropping systems	117
29	Number of plants m ⁻² of ricebean as affected by different maize-ricebean intercropping systems	119
30	Plant height (cm) of ricebean as affected by different maize-ricebean intercropping systems	120

TABLE	TITLE	PAGE
31	Number of pods per plant of ricebean as affected by different maize-ricebean intercropping systems	123
32	1000-grain weight (g) of ricebean as affected by different maize-ricebean intercropping systems	127
33	Biological yield (kg ha ⁻¹) of ricebean as affected by different maize-ricebean intercropping systems	129
34	Grain yield of ricebean (kg ha ⁻¹) as affected by different maize-ricebean intercropping systems	130
35	Harvest index (%) of ricebean as affected by different maize-ricebean intercropping systems	132
36	Leaf area index (LAI) of ricebean as affected by different maize-ricebean intercropping systems	133
37	Crop growth rate CGR (g m ⁻² d ⁻¹) of ricebean as affected by different maize-ricebean intercropping systems	135
38	Net assimilation rate (g m ⁻² d ⁻¹) of ricebean as affected by different maize-ricebean intercropping systems	136
39	Grain protein content (%) of ricebean as affected by different maize-ricebean intercropping systems	137
40	Detail of cost of production of maize (Rs. ha ⁻¹) (Each value is the average of 2-years)	139
	ECONOMIC ANALYSIS	140

LIST OF FIGURES

Fig.	Title	Page
3.1	Meteorological data	38
4.1	Association of number of pods per plant with grain yield of ricebean as affected by planting pattern and stand density during 1995 and 1996.	60
4.2	Association of 1000-grain weight with grain yield of ricebean as affected by planting patterns and stand density during 1995 and 1996.	64
4.3	Association of harvest index with grain yield of ricebean as affected by planting patterns and stand density during 1995 and 1996.	78
4.4	Association of number of pods per plant with grain yield of ricebean as affected by different nitrogen and phosphorus applications during 1995 and 1996.	83
4.5	Association of number of seeds per pod with grain yield of ricebean as affected by different nitrogen and phosphorus applications during 1995 and 1996.	86
4.6	Association of 1000-grain weight with grain yield as affected by different nitrogen and phosphorus applications during 1995 and 1996.	89
4.7	Association of harvest index with grain yield as affected by different nitrogen and phosphorus applications during 1995 and 1996.	96
4.8	Association of 1000-grain weight with grain yield of maize as affected by different maize-ricebean intercropping systems during 1995 and 1996.	109
4.9	Association of harvest index with grain yield of maize as affected by different maize-ricebean intercropping systems during 1995 and 1996.	114

Fig.	Title	Page
4.10	Association of number of pods per plant with grain yield of ricebean as affected by different maize-ricebean intercropping systems during 1995 and 1996.	122
4.11	Association of grains per pod with grain yield of ricebean as affected by different maize-ricebean intercropping systems during 1995 and 1996.	125
4.12	Association of 1000-grain weight with grain yield of ricebean as affected by different maize-ricebean intercropping systems during 1995 and 1996.	126
4.13	Association of harvest index with grain yield of ricebean as affected by different maize-ricebean intercropping systems during 1995 and 1996.	131

LIST OF ABBREVIATIONS

<i>CGR</i>	<i>Crop Growth Rate</i>
<i>NAR</i>	<i>Net Assimilation Rate</i>
<i>LAI</i>	<i>Leaf Area Index</i>
<i>H.I.</i>	<i>Harvest Index</i>
<i>PAR</i>	<i>Photosynthetically Active Radiations</i>
<i>PPm</i>	<i>Parts per million</i>
<i>B.C.R</i>	<i>Benefit Cost Ratio</i>
<i>Kg ha⁻¹</i>	<i>Kilograms per hectare</i>
<i>g⁻¹ m² d⁻¹</i>	<i>Grams per meter square per day</i>
<i>cm</i>	<i>Centimeter</i>
<i>g</i>	<i>Gram</i>
<i>N</i>	<i>Nitrogen</i>
<i>P</i>	<i>Phosphorus</i>
\leq	<i>Less or equal to</i>
$<$	<i>Less</i>



INTRODUCTION

CHAPTER - 1

INTRODUCTION

Production of food, fibre and fuel have throughout history been the most important challenge to humanity. The drastic increase in the world population and the rising living standard have increased the pressure on these resources to an unprecedented level. Consequently there is now worldwide concern over the sustainability and environmental effects of the management practices of modern cropland and other plant production systems. Decreasing supplies of non-renewable resources and food deficit have forced the plant scientists to search for new food plants. According to the nutritionists, edible legumes, an excellent source of dietary proteins, and oils, can play an important role in meeting food needs in this period of food shortage and wide spread malnutrition. Nutritionally, pulses are two to three times richer in protein than cereals. Therefore, the importance of grain legumes (pulses) as a source of vegetable protein in the human diet and their beneficial role in augmenting soil fertility is well known. Besides legumes are used as forage and to control soil erosion. The cultivation of legumes is very ancient and some species are as old as history of civilization.

With the evolution of high-yielding and fertilizer-responsive varieties of wheat and rice, there has been a big increase in the area and production of cereals while pulses have registered a decline as a result of which the cereal-legume cropping balance has been disturbed. The situation became acute during 1979-1982 when the per capita annual consumption of pulses dropped from 9 kg to 5 kg and the country had to import this commodity spending millions of rupees in foreign exchange. The main cause for this crisis was the failure of major pulse crop; chickpea, due to *Aschochyta* Blight. The inherent low productivity of pulses, poor production technology, and relegation of these crops to marginal lands were the other reasons.

In fact, the most important factor responsible for chronic shortage of pulses in the country has been the absence of a comprehensive national research support as has been provided to cereals. On the other hand, some pulses are grown in one part of the world but are not common in other parts. It is, therefore, essential to explore the economic feasibility of less known pulse crops. Ricebean (*Vigna umbellata*), an under utilized crop has a good promise to become a major protein crop for the Tropics and Sub-tropics if managed properly and adjusted well in the present cropping systems.

Preliminary studies at Pakistan Agricultural Research Council have established its success as a grain, fodder and cover crop. However, its economic utility and complete production technology is yet to be determined (Ahmad and Ashiq, 1992). Ricebean is

well adapted to high temperature and humidity as well as to heavy soils, where a few other crops do not grow well. It has a great yield potential and under good management practices it can produce 3000 kg ha⁻¹ seed and 3300-8200 kg ha⁻¹ dry herbage to meet scarcity of green forage during scarcity periods, i.e. April-June and November-December (Mukherjee *et al.*, 1980).

Nutritive value of ricebean is exceptionally high. Protein content of the seed vary from 14-24 per cent and proteins are rich in aminoacids such as methionine and tryptophan (Chandel *et al.*, 1978). The seed also contains 5-7 per cent crude fibre, 3-4 per cent ash, 61-65 per cent carbohydrates, 11-12 per cent aspartic acid and 17-18 per cent glutamic acid. In vitro digestibility of raw seed meal ranges from 82-85 per cent (Rodriguez and Mendoza, 1991). Ricebean in addition to providing fodder, can be served as a fresh vegetable. Its seed can be used as "dal"* and a very tasteful dish can be prepared from the cooked seed.

Among many agronomic factors responsible for its good production, appropriate plant population and its adjustment over the field are of primary importance. The conventional system of planting pulses by broadcast is very defective as the interception of light has been reported to be poor because of mutual shading of the plants.

*A pulse is locally called as "dal".