Increase Productivity and Profitability Through Introduction of Pulses and Oil Seed in T. Aman Fallow Cropping Pattern

B.Sc Honours (Project)

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DECLARATION

I do hereby declare that the whole work submitted as a project entitled **"Increase productivity and profitability through introduction pulses and oil seed in T. aman fallow cropping pattern and stability of them."** In the department of Botany, University of Rajshahi, Rajshahi-6205, for the degree of **Bachelor of Science in Botany** is the result of my own investigation and was carried out under the supervision of **Dr. M. Monzur Hossain,** Professor, Department of Botany, University of Rajshahi, Rajshahi-6205, the project has not been submitted in the substance for any other degree.

Arifa Sultana

CERTIFICATE

It is my pleasure to certify that the research work presented in this dissertation entitled. **"Increase productivity and profitability through introduction pulses and oil seed in T. aman fallow cropping pattern and stability of them."** Is submitted by Arifa Sultana to the Department of Botany, University of Rajshahi. Bangladesh for the degree of Bachelor of Science in Botany.

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ABSTRACT

In the present investigation 3 types of pulses (grasspea, chickpea and lentil) and two types of oil seeds (linseed and mustard) were evaluated for one year in order to study increase productivity and profitability through introduction of pulses and oil seed in T. Aman fallow cropping pattern. Investigation was conducted in three area Paba (Rajshahi District), Patnitala (Naogaon District), Baraigram (Natore District). The profitability of pulses and oil seeds are different from each other. In Paba upazila most profitability crop are lentil and chickpea than linseed, musard and grasspea. In Baraigram upazila most profitable crop is grasspea, lentil and linseed and in Patnitala mustard is the most suitable for cultivation.

CHAPTER I

INTRODUCTION

1.1. INTRODUCTION

Pulses and oil seed are most common crop in Bangladesh. There are different pulses and oil seed in our country. Such as Lentil, chick pea, grass pea, Mustard and Linseed all are cultivated in Rabi season in all over Bangladesh. Pulses are important food crops due to their high protein and essential amino acid content. Like many leguminous crops, pulses play a key role in crop rotation due to their ability to fix nitrogen.

Pulses are an important alternative to vegetable's supplementing the diet of most people in our country. Pulses in general remained a major source of protein wile animal food products rich proteins are beyond the reach of poor people. Pulses are considered as "the meat of the poor" because still pulses are the cheapest source of protein.

Out of the total cropped area of 14.08 million ha; pulses occupy 0.73 million ha; which is about 5.3% of the total land area. The annual requirement of pulses in Bangladesh is about 2.5 million tons considering 45g/capita/day. But the annual production is less than 0.54 million ton. Per capita availability of pulses in the country thus remains far short of the demand. Bangladesh farmer's produce nearly a dozen of pulses crops, but their yield and potential production very enormously between species and across locations.

Lentil: It is the most primitive species of leguminosae family we know it as musor dal. It is originated in Asia. It's seed is round and lenced shaped. It's seed is sown in December-January and harvesting time is March-April.

Chickpea: Chickpae is called sola in Bangladesh. It is originated in south Europe. It's seed is oval in shaped. Seed is snown in Octobor-November and harvesting time is March-April

Grass pea: Greas pea or Lathyrus is commonly known as Khsary in Bangladesh. It's seed is rough & wrinle. Grass pea is probably originated in southern Europe & western Asia.

Oil seed are also a important crop in Bangladesh. Mustard is the most important oil crop of Bangladesh. belonging to the family crucifereae this is herbaceous annuals growing from 30 to 150 cm. In Bangladesh about half of all vegetable oil produced comes from mustard. It occupies about 60% (about 70000 acres) of the total area cultivated with oil-seed crops. The districts of Comilla, Dhaka, Pabna and Rajshahi are the main areas of rapeseed and mustard production. The average yield of the crop in Bangladesh is 4 to 5 times low than the yield of this crop in any of the developed countries.

Mustard: Mustard is commonly known as shoresa. It's seed is round.

Linseed: Linseed is commonly known as “masina’s oil”. Linseed is the member of Linaceae family. It’s seed is round.

1.2. IMPORTANCE OF PULSE AND OIL SEED

Pulses are very high is fibre, containing both soluble and insoluble fibre. While soluble fibre helps to decrease bood cholesterol and control blood sugar levels. Insoluble fibre helps with digestion and regularity. Eating just 125 ml of Pulses per day provides 3-6.5 gm fibre. Pulses provide substantial amounts of vitamins and minerals in a relatively low amount of calories. Pulses have a low glycine index which means they do not cause a fast rise in blood sugar after eating. Eating pulses is a good way to manage blood sugar levels which is particularly important for people with diabetes. Many health organizations recommend eating pulses to maintain good health and prevent chronic disease like diabetes heart disease and cancer. Vegetable oil are very easy to digest It helps in lowering our body’s bad cholesterol levels and raising it’s good cholesterol levels. Eating of pure oil it can lowering our risk of heat disease, heart attack and stroke.

1.3. OBJECTIVES

To identity most suitable pulse and oil seed crops with specific soil types and ecosystem in rainfed condition with increased productivity and profitability.

CHAPTER II

MATERIALS AND METHODS

2.1. MATERIALS

Plant Material

In the present investigation 3 different types of pulses and 2 type of oil seeds are used as plant material are used for plant materials.

3 types of pulses

Khesari: BARI khesari-2

Chickpea: BARI chola-6

Lentil: BARI mosur-3

2 types of oil seeds

Linseed: Nila

Mustard: BARI sarisa-7

2.2. METHODS

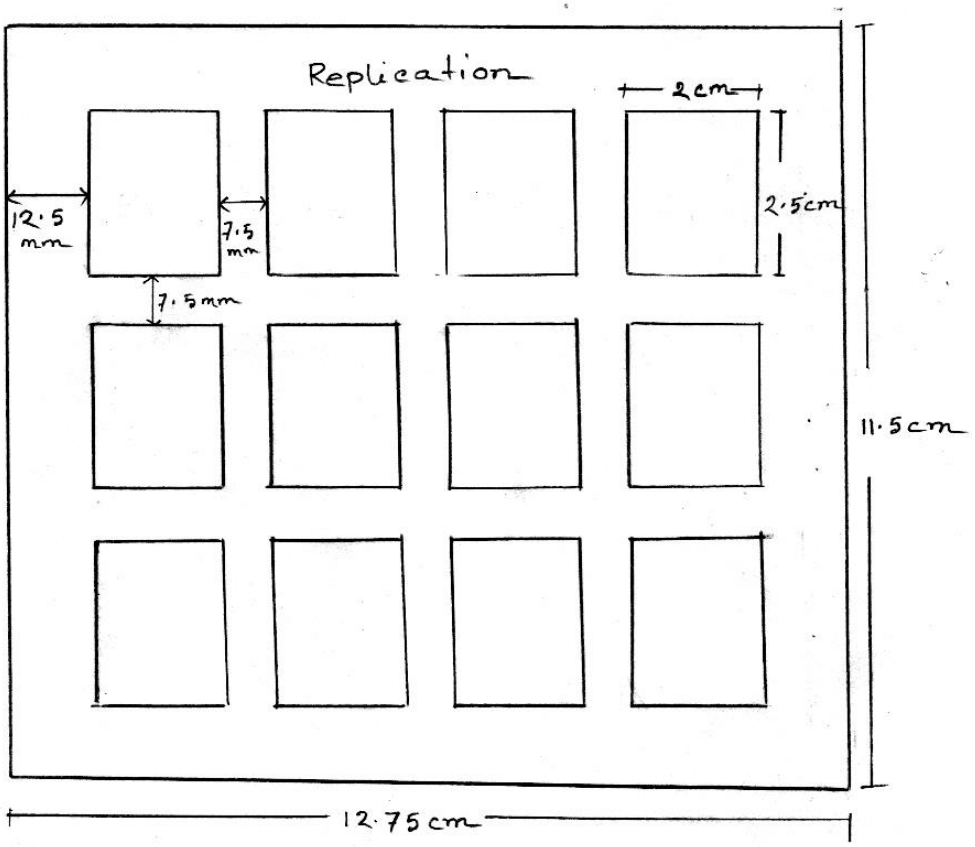
The experiment was set at the Paba, Patnitala and Baraigram Upazila.

2.2.1. Preparation of the Experimental Field

The experimental field was ploughed 4 times repeatedly. Weeds were removed completely before layout of the field and sowing of the seeds. Thus prepared the experimental field was ready for sowing the seed.

2.2.2. Field Design:

Layout of the experimental field (Randomized Complete Block design)



2.2.3. Seed rate

Khesari was applied: 60 kg/ha i.e. 240g/dec, Chickpea was applied:: 60 kg/ha i.e. 240g/dec, Lentil was applied:: 35 kg/ha i.e. 140g/dec, Linseed (Realy) was applied:: i.e. 7kg/ha i.e. 28g/dec, Mustard was applied:: 8kg/ha i.e. 32g/dec

2.2.4. Fertilizer rate

Chickpea: Urea: 40kg/ha i.e. 162g/dec.; TSP: 80kg/ha i.e. 32g/dec. and MOP: 30kg/ha i.e. 121g/dec, Lentil: Urea: 40kg/ha i.e. 162g/dec.; TSP: 80kg/ha i.e. 324g/dec. and MOP: 40kg/ha i.e. 162g/dec, Linseed (Realy): usually grown without fertilizer however, in case of non realy; Fertilizer application will increase yield; Urea: 70kg/ha i.e. 283g/dec.; TSP: 110kg/ha i.e. 445g/dec. and MOP: 40kg/ha i.e. 162g/dec along with irrigation. Mustard: Urea: 250kg/ha i.e. 1.0g/dec.; TSP: 170kg/ha i.e. 690g/dec. and MOP: 90kg/ha i.e. 365g/dec; Gypsum: 150kg/ha i.e. 607g/dec; ZnSo4: 5kg/ha i.e. 20g/dec.; Boric Acid: 10kg/ha i.e. 40g/dec. Khesari (Realy): No fertilizer required but fertilizer may be applied depending on the soil moisture, recommended fertilizer doses for tilling cultivation as Urea: 40kg/ha i.e. 162g/dec.; TSP: 80kg/ha i.e. 324g/dec. and MOP: 30kg/ha i.e. 121g/dec

2.2.5. Seed priming

Seed priming was very necessary because field was very dry and the field capacity level go below during land preparation seed priming was done in Gamla with water 8-10 hr. which enhance uniform and quick establishment of the pulses and oil seed crops.

2.2.6. Seeding: Broadcasting

2.3. COLLECTION OF DATA

The data were collected on individual plant basis. The measurement of character was done following C.G.S system. The agronomical character measured are as follows:

2.3.1. Number of pod/plants

Pod number was count from individual plant

2.3.2. Number of grains/pods

Number of pod was counted from every individual plant and every individual pod.

2.3.3. Thousand grain weight

Thousand grain weight was calculated from dividing the seeds weight per plant by the number of grain/pods.

2.3.4. Yield (t/ha)

Yield was converted to ton per hactors.

CHAPTER III

RESULTS

In the present study profitability of 3 types of pulses (grass pea, chickpea and lentil) and 2 types of oil seeds (mustard and linseed) were evaluated. These crops were cultivated in BRD with 3 replications following recommended field practices in three separate locations viz; Paba (Rajshahi District), Baraigram (Natore District) and Patniatala (Naogaon District). The data on crop yield as metric ton per hector were collected after crop harvest. The results on crop yield and the existing market values in BD Tk (Bangladesh Taka) are presented in Table 1 and 2 respectively.

The results presented in Table 1 showed that crop yield in ton/hac were found to vary with types of crops and location where they were cultivated. The grasspea showed the highest yield in Paba upazila and the lowest yield in Patnitala upazila. Therefore it indicates that grasspea is not suitable crop in Patnitala but favorable in Paba upazila. On the other hand the lentil showed the highest crop yield in Baraigram upazila and also the lowest in Patnitala. However mustard production was the highest in Patnitala and the lowest in Paba (Table 1). In case of chickpea the highest yield was recorded in the Paba upazila and the lowest in Baraigram. However the highest linseed production was recorded in Baraigram and lowest Paba.

The results reveals that the Paba area suitable for the cultivation of lentil and chickpea. On the other hand Baraigram area is suitable for growing grasspea, lentil and linseeds. The suitable crops for the Patnitala upazila is mustard.

The results given in (Table 2) on market value of the crops in three upazilas which is different from each other. The lentil showed the highest profit in Paba upazila and the lowest in Patnitala upazila. Therefore, it indicates that for Patnitala upazila lentil is not profitable but profitable for Paba upazila. On the other in Baraigram upazila lentil showed the highest profit but chickpea showed the lowest profit. It indicates that lentil is profitable in Baraigram. In case of Patnitala upazila mustard gave the highest profit and grasspea gave the lowest profit.

It may be concluded that suitable crop for Paba upazila are lentil and chickpea grasspea, lentil and linseed are suitable for Baraigram upazila. Suitable crop for patnitala is mustard.

Table 1: Yield performance of three types of pulses (grass pea, lentil, chickpea) and two types of oil seed (mustard, linseed) in three Upazila (Paba, Baraigram, Patnitala) in Rajshahi.

Location	Variety				
	Grass pea ton/h	Lentil ton/h	Chickpea ton/h	Mustard ton/h	Linseed ton/h
Paba	2.59	1.65	1.23	1.13	0.15
Baraigram	4.64	1.64	0.29	1.58	0.89
Patnitala	0.75	0.68	1.01	1.74	0.54

Table 2: Market value in taka for grass pea, lentil, chickpea, mustard, linseed in three Upazilas (Paba, Baraigram, Patnitala) in Rajshahi.

Location	Crops Types				
	Grass pea ton/h	Lentil ton/h	Chickpea ton/h	Mustard ton/h	Linseed ton/h
Paba	103,600	165,000	59,040	67,800	36,000
Baraigram	65,600	164,000	13,920	94,800	71,200
Patnitala	30,000	68,000	48,480	104,400	36,000

PICTURE OF DIFFERENT PULSES AND OIL CROPS

Chickpea (Trial Plot)

Mustard (Trial Plot)

Linseed (Trial Plot)

Lentil (Trial Plot)

Grass pea (Trial Plot)

DISCUSSION

Crop production is a complex process. It includes the function of soil, climate, planting and management all of them together. A proper management of these factor may give higher yield. Among the various factors influencing crop growth, soil moisture is one of the most essential one. It influences plant growth and development in various ways. Like any other crop, growth and yield of pulses and oil seed is under control of many environmental factors and soil moisture is one of these factors. Plants are not equally sensitive to soil moisture stress at various stages of growth.

A proper water budget for the requires a good knowledge of water requirement of crops. A review of the water requirement varies mainly with the length of vegetative period. The yield response to irrigation, water depends mainly on proper irrigation scheduling. Irrigation scheduling based on growth stages does not always meet the water requirement of the crop properly. It may result in over irrigation sometimes and under irrigation in others and in both cases yield of the crop is affected (Rashid and Islam, 1986).

In the present investigation the results show that the plant height was significantly higher in all the growth stages under well-watered plants than that of the water-stressed plants. Similar result was observed by Bhat and Rathor (1982) and Chaniara and Damor (1982) in mustard. Mannan, et al. (1992); Morales and Carangal (1981) and Domingo (1981) in mungbean

and El Nadi (1969) in beans observed similar trend of results. Hiler et al. (1972) also observed less plant height in cowpea due to severe drought at all the stages of growth.

The harmful effects of drought are generally more pronounced in stages of growth and development like crown root initiation stage or heading stages where plants have a greater sensitivity to water stress. However, all the physiological process are not equally reacted by sill moisture stress (shaw and Lain, 1968). Under drought the plants become metabolically inactive and the photosynthesis and production of dry matter become practically nil. These effects are primarily attributed by the leaf. Soil water stress reduced the expansion and final size of the leaf and all these can be measured by leaf area parameters (Rahman et al. 2001; Yadav et al. 2003 and Sivakumar and Shaw, 1978)

In the present experiment soil moisture had significant effect on total dry matter. The well-watered plants produced significantly higher total dry matter than the water-stressed plants. Similar result was reported by (Nagarajah and Schutze, 1983); Mondal and Paul, 1994; Begum and Paul, 1993) in mustard, (Kirby, 1969) in Barley, (Sivakumar et al. 1979) in Sorghum. Total dry matter increased slowly at the vegetative stage, but increased rapidly with the advancement of the growth periods Fig. 5. The rapid increase of total dry matter at later stages was due to the continued increase in the stem and pod dry matter as leaf dry matter was declining (Allen et al., 1971; Scott et al., 1973).

Crop yield as a complex character depending upon a large number of morphological and physiological characters. In the present investigation,

seed yield and most of the components of yield were affected by soil moisture.

Robins and Domingo (1962), Day and Intalap (1970) and Sairam et al. (1990) reported that grain yield of wheat were generally reduced by soil moisture stress. Singh and Kumar (1976) reported that the number of effective tillers and grain yield increased with an increase in the number of irrigation in barley. Similar results were reported by Haider and Paul (2003) in wheat. Weight et al. (1983) reported that grain yield, single grain weight and number of grain/plants in the irrigated plants of sorghum had higher values than the rainfed plants.

The plants under irrigation showed better performance than the rainfed condition. Pods per plants, grain per pods, grain yield (kg/h) were higher in plants under irrigated condition. The above parameters were lower in non-irrigation condition. Similar results were reported in barley. In wheat El-Nadi (1969), Destro et al. (2001) reported that plant height, dry weight and grain yield were higher in the favorable water regime treatment. El-Rab et al. (1988).

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