

Studies of different rabi crops under the rainfed condition of Nagaland

Abeni Patton and T. Gohain

Abstract

A field experiment was conducted at the School of Agricultural Sciences & Rural Development (SASRD), Nagaland University, Medziphema Campus farm during rabi 2008 to study the performance of different rabi crops under rainfed condition. Seven different rabi crops such as winter maize, wheat, mustard, sunflower, safflower, linseed and pea were grown. The results of the experiment showed that the growth performance for all the rabi crops were satisfactory. Maximum plant height (112cm) was recorded in winter maize, followed by mustard (92cm) and the lowest (44cm) in pea. Safflower recorded maximum number of branches (21) followed by mustard (10). Mustard recorded maximum (194) number pods (siliqua). Sunflower recorded maximum number of seeds (295) per head followed by maize (292), wheat (36), mustard (16), safflower (22) and minimum was in linseed (5) and pea (6). Maximum test weight (475g) was recorded in pea (fresh wt.) followed by maize (264g), wheat (54g), sunflower (52g), safflower (37g), and lowest was in mustard (2.97g) followed by linseed (8.96g). Pea recorded highest yield (42qha⁻¹) of green pods followed by maize (15qha⁻¹), wheat (11.95qha⁻¹) and poor yield were recorded in linseed (2.37qha⁻¹), safflower (2.64qha⁻¹), sunflower (2.99qha⁻¹). Maximum cost of cultivation (₹.10,200/) was recorded in wheat and in all other rabi crops on an average same amount (₹.8000/-) of cost of cultivation recorded. Maximum net return (₹.72,865/-) and highest benefit cost ratio (7.96) was recorded in pea followed by maize. From this study it can be concluded that under rainfed condition pea can be grown successfully followed by mustard and linseed. However, sunflower and safflower performed very poor.

Key words : Nagaland, mustard, sunflower, safflower, linseed, pea

Introduction

The production system adopted during Green

Department of Agronomy, School of Agricultural Sciences & Rural Development, Department of Agronomy, Nagaland University, Medziphema-797 106

Revolution was explorative and the natural resources like soil and water were subjected to immense pressure beyond carrying capacity (Mhapatra *et al.*, 2007). This led to degradation of not only the crop system but also to the life supporting environment as whole. To feed ever increasing population of our country cropping intensity has to increase both vertically and horizontally. Rice after rice or rice after wheat is the major cropping sequence followed in our country. Dynamic cropping systems are region specific, differing in their portfolios from one region to another. Critical to the successful implementation of dynamic cropping system within a region is a thorough understanding of short term crop sequencing effect on relevant agronomic and environmental parameters. In the North Eastern region rice-fallow is the common sequence. Different rabi crops can be grown after rice. Maize, wheat, pea mustard, sunflower are the major rabi crops growing during winter season. Farmers grow rice and maize in kharif season and mustard in rabi season. But there is lot of potential to grow different rabi crops in this region. Many time farmers are confused to choose the most suitable and rurnartive crops after kharif rice. Considering the needs of growing more number of crops to meet the increasing demand of the population we need the knowledge about the possibilities of growing these crops under rainfed condition in rabi season. Such short term research effort can help to identifying different rabi crops to be grown after rice in Nagaland.

Materials and methods

The field experiment was carried out at Research Farm of School of Agricultural Sciences and Rural Development (SASRD), Nagaland University, Medziphema-797106 during the rabi 2009. The soil of the experimental site was sandy clay loam in texture (coarse sand 38.34%, fine sand 23.15%, silt 19.5% and clay 38.03%) with a bulk density of 1.64mg/m³. The soil pH was slightly acidic (5.7) with an electrical conductivity (EC) of 0.07dS/m. The organic carbon content was 0.95%. The soil was medium available nitrogen (294.8kg/ha), available phosphorous (24.9kg/ha) and available potassium (197.6kg/ha). The experiment was laid out in Randomized Block Design replicated thrice.

The field experiment consist of even treatments of different rabi crops i. e. T₁-Maize, T₂-Wheat, T₃-Mustard, T₄-Sunflower, T₅-Safflower, T₆-Linseed and T₇-Pea. All these rabi crops were grown following standard package of practices under rainfed condition. The performance of these rabi crops were judged based on their growth and yield performance. The economics were worked out using market price of inputs and minimum support prices of output. The benefit : cost ratio was calculated as the net income divided by the cost of cultivation of the crop.

Results and discussions

Growth parameters

Data pertaining to various crops growth attributes indicated that all the seven crops had grown successfully during the period of investigation. Maize being a tall plant habit attained a height of 112cm followed by mustard 92cm, sunflower 75cm, wheat 70cm, and pea 44cm. The plant height increased with the advancement of age in all the rabi crops because, growth process are irreversible in nature (Anonymous, 1969). Highest number of branches (21) was recorded in safflower followed by mustard (11) and linseed (6). The high number of branches in mustard could attribute to the findings of Thakur *et al.* (1998), who also reported that this could be due to the fact that October sown crop mean temperature (18.4-23.7⁰C) was optimum for vegetative growth.

Yield attributes

Mustard recorded highest number of siliqua/head/pod (194) followed by linseed (49), safflower (15) and pea (4) per plant respectively. The data presented in the Table 1 indicated that the number of seeds/grain per pod/cobs/panicle/head differed significantly due to the different treatments. The maximum number of seeds/head observed in sunflower (296) which was at par with maize (292). The minimum number of seeds/head linseed (5) which was at par with pea (6). Mustard and safflower recorded 16 and 22 number of seeds per siliqua and head respectively. Maximum yield (q/ha) was observed in pea (41.67q ha⁻¹ of fresh pod yield). Sharma *et al.* (1995) also observed similar results with different rabi crops and pea found to give the highest yield. Linseed (2.37q ha⁻¹), safflower (2.99q ha⁻¹) and mustard (4.24q ha⁻¹) yielded very low during the period of investigation under rainfed condition. The lowest yield of

linseed was similar to findings of Thakur *et al.* (1998), where rice was followed by linseed. Moisture stress at the time of grain filling (terminal stress) resulted in more unfilled grains with less test weight and low grain yields. This finding is confirmed the results of Daulay and Singh (1983) who also reported that the reduced growth and yield component in stress environment is attributed for getting decreased grain yields. It is evident from the data presented in Table 1. that the highest cost of cultivation was recorded in pea (₹.10475/-) followed by wheat (₹.10200/-). Mustard recorded the lowest cost of cultivation (₹.7455/-). Parihar *et al.* (1999) also observed that the maximum cost was in pea and minimum in mustard because of lower cost required in raising Indian mustard. Highest gross return was recorded in pea (₹.83340/-) followed by maize (₹.22710/-) and lowest was in linseed (₹.13200/-). Maximum net return was recorded in pea (₹.72865/-) followed by maize (₹.14755/-). Similar finding was also recorded by Pandhi (1993) where garden pea after kharif rice system obtained highest net return and cost benefit ratio. The lowest net return was obtained in linseed (₹.3445/-), followed by sunflower (₹.5575/-). Highest benefit : cost ratio was recorded in pea (7.96). The possible reason for the heist value might due to short duration of crop reducing their infestation to insect pest and early harvest reducing their cost of maintenance in the field. Hence from the result of this experiment can be concluded that in rabi season pea and mustard can be grown successfully under rainfed condition of Nagaland.

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Table 1: Growth and yield attributes of different rabi crops studied

Treatments	Plant height (cm)	No. of branches/cobs/head per plant	No. of pods/silique	No. of seed/podweight /head	No. of 1000grain (cm)
T ₁ -Maize	112.13	1	1	292	264
T ₂ -Wheat	69.73	1	1	36	54
T ₃ -Mustard	91.70	10	194	16	297
T ₄ -Sunflower	77.47	1	1	296	52
T ₅ -Safflower	69.07	21	15	22	37
T ₆ -Linseed	63.67	5	20	5	9
T ₇ -Pea	43.67	1	4	6	475
SEm±	5.221.26	6.35	8.61	7.65	
CD (P=0.05)	15.65	3.77	19.04	25.84	22.94

Table 2: Grain yield, cost of cultivation and benefit cost ratio of different rabi crops

Treatments	Yield of grain (q ha ⁻¹)	Cost of cultivation (₹.)	Net return (₹.)	B:C ratio
T ₁ -Maize	15.14	7955	14755	2.85
T ₂ -Wheat	11.95	10200	7725	1.76
T ₃ -Mustard	4.24	7455	9505	2.27
T ₄ -Sunflower	2.99	7655	7295	1.95
T ₅ -Safflower	2.64	7625	5575	1.73
T ₆ -Linseed	2.37	8405	3445	1.41
T ₇ -Pea (pod)	41.67	10475	72865	7.96
SEm±	0.79	-----	-----	-----
CD (P=0.05)	2.34	-----	-----	-----