Original Research Article

Impact and assessment of FLDmanagement of weed in pineapple by plastic mulch

Abstract

Twenty-five numbers of frontline demonstrations were conducted on management of weed in pineapple by plastic mulch 2014-2016 & 2016-2018subsequently with an ultimate aim to supressed growth of weeds and increase farmer income because approximate 30-40% of total cost of cultivation goes in weeding. Pineapple cultivation with 50 micron black polythene sheet mulching with double row spacing i.e. 90 x 60 x 30cm notonly suppresses the weed growth but conserves the soil moisture, which leads to early flowering,better vegetative growth & higher yield over control (Farmer practice). The demonstrated recorded an average yield ranging from 43.18 to 45.90 t/ha with a mean of 44.54 t/ha. The per cent increase yield in demonstration 49.77% during 2014-16 and 66.67%during 2016-18 respectively, over the farmer practice. The average ranges of extension gap (14.35- 18.36t/ha), technology gap (9.10- 11.82 t/ha) and technology index (21.49-16.55%) were during the period under study. The demonstrated field gave higher mean gross return (Rs. 267240 /ha) and mean net returns (Rs. 191740/ha) with average benefit: cost ratio (3.54) compared to the local checks (1.71). Present results clearly show that the yield and economics of pineapple can be boost up by adoption of recommended technology.

Key words: Pineapple, Mulching, Weed growth,Net return Technology gap, Extension gap, yield

Introduction:

Pineapple (*Ananascomosus*) belongs to the family of Bromeliaceae; is a tropical fruit with edible multiple fruit consisting of coalesced berries, native to the American tropics (Bartholomew *et al*., 2002). It is a hardy tropical fruit cultivated in all tropical and subtropical countries and grows well in frost-free areas between 25^0 north and south of the equator (Samson, 1986).

India is the fifth largest producer of pineapple with an annual production of 1706 thousand MT from 103 thousand hectare area in 2017- 18 (NHB data, 2017-18). In Mizoram pineapple cultivated is in area of 5030 ha with a production of 27640MT, with the average productivity of 5.49Mt/ha. Pineapple is consumed mainly as a fresh fruit and a wide range of processed products are also prepared out of it.

Mamit district enjoys a warm humid sub-tropical climate in most of the summer months with short cold & dry winter months. This is suitable for pineapple cultivation. The temperature ranges from 9^0C to 24^0C and from 24^0C to 36^0C during winter and summer respectively. The district receives abundant rainfall with an average of 2506 mm in a year from second fortnight of March to first fortnight of October. Heavy weed infestation is one of major problem of pineapple cultivation. Weeds compete with crops for nutrition and space and reduce yield of crop

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drastically. Lots of money expend in weeding that increases cost of cultivation. Samson (1986) reported that pineapple heavily suffers from weed competition and the use of paper or plastic mulch and timely application of herbicides are the best means of preventing weed competition for high yield. According to Chadha*et al.* (1997), pineapple because of its inherent slow growth and the wider space between the rows is prone to continual weed germination and growth leading to severe competition and as a result, yield reduction could reach as high as complete crop failure at worst conditions. Similarly, Bose and Mitra (1990) reported that weeds pose a serious problem in the cultivation of pineapple especially during the rainy season and manual weeding accounts to 40 per cent of the total production.

Frontline demonstration (FLD) is the concept of field demonstration evolved by the ICAR with the inception of the Technology Mission on Oilseeds during mid-eighties to show the performance of new varieties including recommended production technologies on farmers' fields under real farm situations for increasing productivity and returns with the objectives are. To demonstrate production potential of newly released varieties and proven technologies of Agriculture and allied sectors from NARS in the farmers' fields under different agro-eco situations. To generate data on factors contributing towards productivity and production enhancement under various farming situations. To utilizes these demonstrations for training of farmers and extension personnel and generating feedback.

In this context the present frontline demonstration was taken up by KrishiVigyan Kendra Mamitat farmers filed MamitDistrict Mizoram India to show effectiveness of plastic mulching in management weeds problem pineapplewith good agricultural practices to convincing farmers and also extension functionaries together for further wide scale diffusion.

Materials and Methods

The frontline demonstrations were conducted by KrishiVigyan Kendra, Mamit in different locations of Mamit District during during 2014-16 and 2016-2018Total 25 farmers were selected for front line demonstrations onmanagement of weed in pineapple by plastic mulch. The critical inputs were supplied to farmers and applied as per recommended package of practices for cultivation of pineapple developed by AAU, Jorhat, Assam, Demonstrations at farmer's fields were regularly monitored by Subject Matter Specialists (SMSs) of KrishiVigyan Kendra, Mamit from the time ofplanting to harvesting and marketing. Basic data of all 25 farmers were collected before and after frontline demonstration by personal interview with the help of well-structured interview scheduled. The interview schedule was developed through discussion with experts, scientists and extension officers of Horticulture department in the district. Before initiating the demonstration, the beneficiary farmers were given skill training on various technological aspect of pineapple cultivation including use of plastic mulch for weed management. The yield and economic performance of frontline demonstrations, the data on output were collected from FLDs as well as local plots (cultivation without mulching), and finally yield, cost of cultivation, net returns with the benefit cost ratio was worked out. Data

collected on demonstrated plot yield was obtained using the data from frontline demonstrations conducted in the farmer's field under the close supervision of scientists from KrishiVigyan Kendra, Mamit in different locations of the district. Further, information on actual yield obtained by the farmers on their farms under their own management practices was collected. The gathered data were processed, tabulated, classified and analysed in terms of mean percent score and ranks in the light of objectives of the study. Using these data, the differences between potential yield and demonstration plot yield (Yield gap-I), difference between demonstration plot yield and actual yield or yield under existing practice (Yield gap- II) and difference between potential yield and actual yield (Total yield gap) were worked out.The extension gap, technology gap and technology index were calculated using the formula as suggested by Samui et al., (2000).

Technological gap (yield gap-I) = Potential yield - Demonstration plot yield
Extension gap (yield gap- II) = Demonstration - Actual yield (Farmers plot yield practice)
Total yield gap = Potential yield - Actual yield.
Technology index (%) = Technology gap/Potential yield x 100

Results and discussion:

The results obtained from the present investigation as well as relevant discussion have been summarized under following head:

Growth attributes and yield

A comparison of growth attributes and yield performance between demonstrated practices and local checks is shown in Table-2. Results indicated that, the demonstration of management of weed in pineapple by plastic mulchrecorded higher plant height (96.5cm), Fruit weight (1.28kg.), yield (44.54mt/ha) and lower weed intensity (2.6/sq. m.) when compared to farmers practices which were plant height (84.6cm), Fruit weight (0.81kg.), yield (28.19.54mt/ha) and weed intensity (16.7/sq. m.) recorded in farmers practice (Alwis, A. J. and Herath, H. ,2012)&Dusekaet al., 2010.

Yield gap:

The yield gaps are presented in Table 3. The potential yield of pineapple was found to be 55.00mt/ha and the demonstration plot yield was sustainable higher than that in the local check in all the years of the study (2014-16 and 2016-18) which was recorded 43.18mt/ha &45.90mt/ha by frontline demonstrations during 2014-16 and 2016-18 respectively. Whereas the actual yield obtained by the farmers on their farm with their own management practices was obtained 28.83mt/ha &27.54mt/ha during 2014-16 and 2016-18 respectively. It performed better in demonstration plots due to better weed management and retention moisture by plastic mulching. Thus the FLD might have a positive impact on farming community in the district by enhancing yield to a tune of 49.77% during 2014-16 and 66.67% during 2016-18 respectively, over the local check. The results indicated that the front line demonstrations have given a good impact over the farming community of Mamit district as they were motivated by the plastic mulching and good agricultural practices applied in the FLD plots.This finding is in corroboration with the

findings of Dhaka et al., 2015; Lal et al., 2016; Meena et al., 2016 and Verma et al., 2016,Singh et al., 2017&OuattaraGenefolet al., 2017.

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Yield of the front line demonstration trials and potential yield of the crop was compared to estimate the yield gaps which were further categorized into technology and extension gaps (Hiremath and Nagaraju, 2009).

Technology gap

The technology gap is the difference or gap between the demonstration yield and potential yield and it was 11.82 and 9.10, 2014-16 and 2016-18 respectively (Table 4).The technological gap may be attributed to the dissimilarity inthe soil fertility status, acidity to erratic rainfall and other vagaries of weather conditions (Mukharjee, 2003)(Table 4)

Extension gap

The extension gap is the difference or gapbetween demonstration yield and farmerspractices (control). Extension gap ranged from 14.35 – 18.36mt/ha during the period under study (Table 4). This extension gapshould be assigned to adoption of improvedtransfer technology in demonstrationspractices resulted in higher head yield thantraditional farmer practices. This emphasizedthe need to educate the farmers throughvarious means for more adoption of improvedhigh yielding varieties and newly improvedagricultural technologies to bridge the wideextension gap. More use of new high yieldingvarieties by the farmers will subsequently change this alarming trend of gallopingextension gap. The new technologies willeventually lead to the farmers todiscontinuance of old varieties with the newtechnology. This finding is in corroboration with the findings of Hiremath and Nagaraju (2010).

Technology Index

The technology index shows the feasibility of the variety and evolved technology at the farmer's fields and a lower the value of technology index is the feasibility more. The technology index was reduced from 21.49 to 16.55 per cent during 2014-16 to 2016-18 (Table 4) which shows the higher feasibility of the demonstrated technology. This finding corroborates results of Lal et al., 2016; Meena et al., 2016 and Poonia et al., 2017.

Economics of front line demonstration

Economic analysis of yield performance revealed that besides higher production, participating farmers in FLDs realized a higher price of than produce compared to that in the local checks during the period under study. The economics of pineapple production under front line demonstrations have been presented in Table 5. The results of economic analysis of pineapple production revealed that mean cost of cultivation increased in demonstration practice (Rs 77500/ha) as compared to Farmers practice plot check (Rs 57200/ha) and it was recorded higher mean gross return (Rs. 267240 /ha) and mean net returns (Rs. 191740/ha) whereas in farmers practice the mean gross returns (Rs 98130 /ha) and mean net returns (Rs 134490 /ha). And with the average benefit: cost ratio of demonstration plot (3.54) compared to the farmers practice (1.71) over the study period. These results are in line with finding of Kumari and Jat, 2021; Meena et al., 2016; Verma et al.,2016 and Poonia et al., 2017.EshetuTadesseet al., 2017

Conclusion:

The study concluded that concluded that the results of the present study clearly demonstrated that weeds seriously competed with pineapple leading to an enormous yield loss. Plastic mulches can prove as a boon to enhance productivity. Yield of pineapple increased 50-60% by using plastic mulch (50 micron).This could may be due to enhance soil moisture

retention, suppress weed growth. The FLD programme is an effective tool for increasing the production and productivity of pineapple and changing the knowledge, attitude and skill of the farmers. The concept of frontline demonstration may be applied to all farmer categories including progressive farmers for speedy and wider dissemination of the recommended practices to other members of the farming community.

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Table.1: Details of technological interventions followed under farmer's practices and demonstration

Frontline Demonstration (Demonstrated Package)	**Farmers Practice (Local Check)**
Mulching -Black plastic, 50 micron The plastic film will be laid on the well prepared bed prior to planting. The suckers/slips should be plan ted at recommended spacing by making suitable hole. **Variety** : Kew **Spacing:** 30X 60 X 90 cm.	Manual weeding, no mulching **Variety** : Kew **Spacing:** 30X 60 X 90 cm. **Nutrient Management** : A dose of N, P_2O_5 and K_2O at 12,4 and 12 g./plant/year

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Table 2: pooled data (2014-16& 2016-18) of FLD on growth attributes and yield of Pineapple

Sl. No.	Parameter	Demonstration	Farmers Practices
1.	Plant height (cm.)	96.5	84.6
2.	Fruit weight (kg.)	1.28	0.81
3.	Weed intensity (per sq. m)	2.6/sq. m.	16.7/sq. m.
4.	Yield (MT/ha)	44.54 t/ha	28.19t/ha

Table 3: Yield and yield difference of pineapple under front line demonstrations

Year	No. of FLDs	Yield (MT/ha)		Additional yield over local check (MT/ha)	Per cent increase yield over local check
		FLD	Local Check		
2014-16	25	43.18	28.83	14.35	49.77
2016-18	25	45.90	27.54	18.36	66.67
Mean	25	44.54	28.19	16.36	58.03

Table 4: Yield gap and technology index in front line demonstrations

Year	No. of FLDs	Technology gap (t/ha)	Extension Gap (t/ha)	Technology Index (%)
2014-16	25	11.82	14.35	21.49
2016-18	25	9.10	18.36	16.55
Mean	25	10.46	16.36	19.02

Table 5: Economics of front line demonstration:

Year	Cost of cultivation (Rs/ha)		Gross Return (Rs/ha)		Net Return (Rs/ha)		B: C Ratio	
	FLD	Local Check	FLD	Local Check	FLD	Local Check	FLD	Local Check
2014-16	74000	56000	259080	86100	185080	129080	3.50	1.54

2016-18	77000	58500	275400	110160	198400	139900	3.58	1.88
Mean	75500	57250	267240	98130	191740	134490	3.54	1.71