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RESEARCH NOTE :

Assessment on the cauliflower based intercropping system on system productivity in Tripura

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SUMMARY : Intercropping is being adopted as a method of crop production by the farmers of Tripura. Farmers often intercrop legumes with non-legumes. A study was conducted in the farmer's field of Khowai district of Tripura during 2014. The objective of the study was to assess the productivity of cauliflower (*Brassica oleracea*) and pea (*Pisum sativum*) in sole and intercropping system to find the best combinations which yield highest production. Cauliflower and pea were planted under four different row arrangements (T_1- Cauliflower as sole crop, T_2- Pea as sole crop, T_3- Cauliflower: pea (1:1), T_4- Cauliflower: pea (1:2) in the open field. Land equivalent ratio (LER) was calculated to identify the best system of intercropping and it was recorded that incase of T_4 *i.e.*, Cauliflower: Pea (1:2) LER was greater than one *i.e.*, 1.04, indicating that this cropping system is profitable in terms of land utilization. Moreover, results of analyses using benefit-cost ratio showed that the most favourable mix of vegetables which could be recommended for adoption to farmers was the intercrop of a row of cauliflower with two rows of Pea (T_4- 1:2).

KEY WORDS :
Intercropping, Sole cropping, Land equivalent ratio (LER), Pea, Cauliflower

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Intercropping is the growing of two or more crop species simultaneously on the same field. This is a common practice in most countries in the tropics. Vegetable crops failures are common under irrigated areas due to insect and disease infections or due to the prices that go up and down according to supply and demand. Therefore, it was recommended to practice intercropping, the agricultural practice of cultivating two or more crops simultaneously in the same piece of land. This cropping system might provide insurance crop failure by reducing disease (Fininsa and Yuen, 2002; Sharaiha *et al.*, 1989) and insect incidence (Girma *et al.*, 2000; Gahukar, 1989) or against unstable market prices by planting two or more crops under intercropping and thus, reducing the risk of unexpected changeable prices. It was shown by many researchers that intercropping of different vegetable crops provided important advantages as well as higher profitability than vegetables grown as sole crops (Willey, 1979; Sharaiha and Haddad, 1985; Nursima, 2009). There are several possible benefits of intercropping legumes with non-legumes. In terms of land use efficiency intercropping is regarded as more productive than sole

Table 1 : Yield, relative land equivalent ratio (LER) and total LER, B:C of cauliflower and pea under different row arrangements

Treatments	Yield (q/ha) cauliflower pea	Relative LER cauliflower pea	Total LER	B:C
T_1 - Cauliflower	170 -	1 -	1	1.8
T_2 - Pea	30	- 1	1	1.9
T_3 - Cauliflower: Pea (1:1)	75.5 16.5	0.44 0.55	0.99	1.7
T_4 - Cauliflower: Pea (1:2)	52.4 22.1	0.31 0.73	1.04	2

cropping (Andrew and Kassam, 1976). Higher nutrient uptake and better water use efficiency have also been suggested (Dallal, 1974 and Baker and Norman, 1975). The advantage is often expressed as a land equivalent ratio (LER). LER greater than one indicates that more sole cropped land than intercropped is required to produce a given amount of product. Nitrogen fixing legumes generally do not need nitrogen fertilizer, whereas, the non-legumes requires additional mineral nitrogen for optimum growth. Besides its own nitrogen requirement, legumes may contribute additional nitrogen to the soil, which can be used by the component crop in the intercrop or the succeeding crops. The objective of the study was to evaluate the productivity of intercropping cauliflower with pea.

The investigation was conducted during winter season, 2014 in the farmer's field of Khowai district of Tripura with the following treatments-

- Monoculture (sole cropping) of pea (T_1)
- Monoculture (sole cropping) of cauliflower (T_2)
- Cauliflower intercropped with pea in alternate rows of ratio one to one (T_3-1:1)
- A row of cauliflower intercropped with a pair row of pea of ratio one to two (T_4- 1:2)

Every treatment plot consisted of six rows 75cm apart and 15 meters long. Gap filling or thinning was carried out subsequently to achieve an optimum plant stand. Compost was applied one week before planting at the rate of 18 Mt.ha^{-1}. Weeds were kept under control manually. Three replications were used at harvesting, five guarded/plants were randomly chosen to determine the yield. Intercropping was assessed, relative to that of sole crops, by use of land equivalent ratio (LER), which is defined as the proportion of land area that is required for sole cropping to produce the same yields as intercropping (Mead and Willey, 1980). The LERs were calculated using the formula-

LER = Ym/Sm + Ys/Ss

where, Ym and Ys are the respective yields of cauliflower and pea in intercropping and Sm and Ss are the respective, yields of cauliflower and pea in sole cropping.

The yield response, LER and B:C ratio of different intercropping system are given in Table 1.

The efficiency of intercropping in this study was evaluated by determining the resultant LER. LER is defined as the relative land area under sole cropping that is required to produce the yield achieved in the intercropping. When the values of LER are greater than one under intercropping system, this result indicates the efficient of land use as compared to sole cropping. The Table 1 reports the calculated total LER for all the intercrop combinations that were planted under different row arrangements. Thus, it shows that highest LER *i.e.*, 1.04 was found when one row of cauliflower was intercropped with two rows of pea. This is logical since each combination of two crops and their row arrangement allowed for special local microenvironment for each plant, changing the competition for light, moisture and nutrient (Sharaiha *et al.*, 2004). But, in case of pea, pods per plant and seed per plot were not affected by intercropping. Highest B: C was also recorded in case of T_4. Similar investigation was also made by on the related topic Hirwe and Mahajan (2012); Chandranath *et al*. (2011); Math and Halikatti (2012) and Sahoo and Tarai (2014).

Conclusion :

The results of this study showed that cauliflower and pea could be intercropped in 1:2. Intercropping is much more efficient in utilizing the available resources than sole cropping as indicated by the high LER value.

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