



IMPACT OF DIFFERENT INTERCROPS ON THE YIELD ATTRIBUTING CHARACTERS AND ROOT KNOT NEMATODE INFESTATION IN CAULIFLOWER

N.K. Agarwal, R.K. Gangwar N.K. Gupta and Vijai Kumar¹

Krishi Vigyan Kendra, Chomu, Jaipur 303 702 (Rajasthan)

¹Department of Horticulture, CCR (PG) College, Muzaffarnagar (Uttar Pradesh)

E-mail :- gangwarrakesh@yahoo.com

ABSTRACT

The present study on the intercropping of cauliflower (*Brassica oleracea* var. *botrytis*) carried out with the aim to find out the best intercropping system with better growth, yield and less infestation of rot knot nematode. Cauliflower intercropped with fenugreek (T_4) was significantly achieved the maximum plant height (44.60 cm) at 60 days after transplanting in comparison to other treatments (40.30 – 43.75 cm) as well as the mono crop cauliflower/ control (38.55 cm). After 60 days of transplanting T_4 (cauliflower + fenugreek) recorded the maximum plant spread (65.61 cm) followed by intercropping with garlic (64.70 cm), marigold (63.47 cm) and onion (60.31 cm) in comparison to mono crop cauliflower (58.20 cm). Only 3.10 per cent plants of cauliflower were affected by root knot nematode in cauliflower + marigold followed by cauliflower + Garlic (6.68%), cauliflower + fenugreek (7.29%), cauliflower + onion (7.54%) and cauliflower mono crop (9.21%). Intercropping of cauliflower with marigold recorded maximum curd yield (10.86 kg/plot and 15.56 tones/ha) in comparison to other treatments and control. Similarly the biomass yield (kg/plant) was significantly more in cauliflower intercropping with marigold (1.72 kg/plant) in comparison to other treatment and control.

Key Words : Cauliflower, Height, Spread, Curd Yield, Intercropping, *Meloidogyne incognita*.

Cauliflower (*Brassica oleracea* var. *botrytis*) is one of the most popular cole crop, growing during winter season mostly in all over the Rajasthan. Farmers are generally growing cauliflower as a sole crop. The efficiency of vegetable production depends upon the maximum utilization of sunshine received on land area occupied by the crop. During its early stages of growth,

a crop does not have enough leaf area to use most of the solar radiation falling on the field. Maximum use of solar radiation usually occurs at a certain leaf area index, the duration of which is usually relatively brief in short duration crop. Where the crops takes a long time to fill out the area due to wide spacing between its rows and plants, much sunshine is wasted. One way of reducing

the loss is to use intercrops, which is another method of increasing the productive of farm through increased light of space utilization. Intercropping is a traditional system practiced by peasant farmers in the tropics and the most important advantage of intercropping is that it is more efficient and productive than sole cropping due to its higher combined yield. Intercropping in tomato gives more return as compared to monoculture (Singh and Srivastava, 1981 and Ahmad, 1995). Cauliflower and Cabbage intercropping with spinach, fenugreek, radish, carrot, tomato and other crops gave better returns in comparison to sole crops (Chavan *et al.*, 1984; Nadal and Srivastava, 1986; Verela and Guharay, 1988, Kandoria *et al.*, 1999 and Varghese, 2001). The intercropping systems Okra + Radish and Okra + French bean gave higher return than the sole crop (Prabhakar and Shukla, 1990). Plant parasitic nematodes are the biotic factors that adversely affect the productivity of all vegetable crops. Among them root knot nematodes (*Meloidogyne incognita*) causing the major constraints in the production of cauliflower. Alam *et al.*, 1977) reported the influence of intercultural marigold and margosa with some vegetable crops on plant growth and nematode population. Sitaramiah *et al.*, (1971) studied in detail about the plant parasitic and soil nematodes of India. Therefore, this study was carried out with the aim to study the performance of different intercrops on the yield attributing characters and root knot nematode infestation in cauliflower

MATERIALS AND METHODS

The present experiment was conducted during winter seasons of 2011-12 and 2012-13 at Krishi Vigyan Kendra, Chomu (Tankarda) Jaipur. The experiment was carried out in Randomized Block Design with three replications. The treatments comprised viz., T₁ – mono crop cauliflower (control), T₂ – cauliflower + onion, T₃ – cauliflower + garlic, T₄ – cauliflower + fenugreek, T₅ – cauliflower + marigold. The experimental field was prepared by ploughing with a tractor drawn disc plough following two cross harrowing and planking. The field was thoroughly leveled by a leveler before the experiment. The plot size was

1.5X3.0 meter. The seedlings of cauliflower variety snowball-16 were transplanted at 60X60 cm spacing in the experimental field during evening and then irrigated. Simultaneously intercrops were sown/transplanted on same day in between the cauliflower rows. Observations were recorded on plant height in cm (15, 30, 45 and 60 DAT), plant spread in cm (15, 30, 45 and 60 DAT), root knot nematode infestation (60 DAT), curd yield (kg/plot and tones/ha) and plant biomass yield (kg/plant). The data were analyzed by using analysis of variance.

RESULTS AND DISCUSSION

The data in table 1 showed that all the treatments significantly increased the plant height (cm) at 60 days after transplanting. Cauliflower intercropped with fenugreek (T₄) was significantly achieved the maximum plant height (44.60 cm) at 60 days after transplanting in comparison to other treatments (40.30 – 43.75 cm) as well as the control (38.55 cm). The plant height of different treatment at 60 days after transplanting was 43.75 cm in intercropping with marigold (T₅) followed by intercropping with garlic (41.67 cm) and intercropping with onion (40.30). At the preliminary stages of growth (15 and 30 DAT) plant height was influenced by different intercrops remained non-significant. However, at later stages of growth (45 and 60 DAT) plant height was significantly influenced by different intercrops. During the earlier stages of plant growth (height), the insignificant result obtained due to different treatments may be attributed to delayed root establishment of the main crop. Because cauliflowers are susceptible to transplanting stocks and hence, delayed establishment as well as delayed and interrupted supply of nutrients to the seedlings. However, at later stages the significant variation in plant height among different treatments may be attributed to better and early root establishment and regular, uninterfered supply of essential nutrients at right time and in an appropriate quantity. A similar trend was noticed in plant spread where intercropping treatments remained insignificant at initial stages of crop growth (15 and 30 DAT). Whereas all the treatments were significantly influence

Table 1: Effect of different intercrops on plant height, plant spread and root knot nematode infestation in cauliflower

Treatments	Pooled Mean (2011-12 and 2012-13)								Root knot nematode infestation (%) 60 DAT
	Height (cm)				Plant spread (cm)				
	15 DAT	30 DAT	45 DAT	60 DAT	15 DAT	30 DAT	45 DAT	60 DAT	
T ₁ - Mono Crop-Cauliflower	11.98	12.45	20.85	38.55	10.10	14.12	38.10	58.20	9.21 (17.67)*
T ₂ - Cauliflower + Onion	12.10	13.45	22.50	40.30	10.98	15.15	39.29	60.31	7.54 (15.94)
T ₃ - Cauliflower + Garlic	13.05	14.33	23.10	41.67	11.10	16.98	40.50	64.70	6.68 (14.98)
T ₄ - Cauliflower + Fenugreek	13.85	14.65	25.40	44.60	12.21	17.13	43.40	65.61	7.29 (15.66)
T ₅ - Cauliflower + Marigold	13.33	14.10	23.70	43.75	11.07	16.98	41.68	63.47	3.10 (10.14)
Mean	12.86	13.99	23.11	41.77	11.29	16.17	40.18	62.46	6.76
S.E. ±	0.93	0.97	0.21	0.53	1.06	0.95	0.62	0.64	1.34
C.D. (P=0.05)	3.10	2.21	0.93	1.03	2.95	3.10	1.10	0.89	2.87

*Angular transformed values are in parenthesis.

DAT = Days After Transplanting.

Table 2 : Effect of different intercrops on curd yield/ plot, curd yield/ha and biomass yield/plant of cauliflower.

Treatments	Polled Mean (2011-12 and 2012-13)		
	Curd yield (kg/plot)	Curd yield (tone/ha)	Biomass yield (kg/plant)
T ₁ - Mono Crop-Cauliflower	9.42	14.05	1.16
T ₂ - Cauliflower + Onion	9.76	14.56	1.43
T ₃ - Cauliflower + Garlic	9.81	14.75	1.38
T ₄ - Cauliflower + Fenugreek	10.63	15.48	1.47
T ₅ - Cauliflower + Marigold	10.86	15.56	1.72
Mean	9.88	14.78	1.33
S.E. ±	0.72	0.81	0.32
C.D. (P=0.05)	1.28	1.46	0.55

the plant spread at 45 and 60 days after transplanting. However after 60 days of transplanting T₄ (cauliflower + fenugreek) recorded the maximum plant spread (65.61 cm) followed by intercropping with garlic (64.70 cm), marigold (63.47 cm) and onion (60.31 cm) in comparison to mono crop cauliflower (58.20 cm). The study on the root knot nematode infestation is presented in Table 1 showed that cauliflower inter cropping with marigold significantly reduced *Meloidogyne incognita* (Root knot nematode) infestation in cauliflower roots, in comparison to other treatments and control (cauliflower mono crop) . Only 3.10 per cent plants

were affected by root knot nematode after 60 days of cauliflower transplanting in cauliflower + marigold followed by cauliflower + Garlic (6.68%), cauliflower + fenugreek (7.29%), cauliflower + onion (7.54%) and cauliflower mono crop (9.21%). These findings having close concern with the findings of earlier workers (Sitaramahiah *et al.*, 1971; Alam *et al.*, 1977; Chavan *et al.*, 1984; Prabhakar and Shukla, 1990 and Varghese, 2001)

The data presented in Table 2 revealed that the intercropping of cauliflower with marigold recorded significantly more curd yield in comparison to other

treatments and control. Intercropping of cauliflower with marigold recorded maximum curd yield (10.86 kg/plot and 15.56 tones/ha) followed by intercropping with fenugreek (10.63 kg/plot and 15.48 tones/ha), intercropping with garlic (9.81 kg/plot and 14.75 tones/ha), intercropping with onion (9.76 kg/plot and 14.56 tones/ha) and cauliflower mono crop (9.42 kg/plot and 14.05 tones/ha). The same trend was found in the biomass yield (kg/plant). It was significantly more in cauliflower intercropping with marigold (1.72 kg/plant) followed by intercropping fenugreek (1.47 kg/plant), intercropping with onion (1.43 kg/plant), intercropping with garlic (1.38 kg/plant) and cauliflower mono crop (1.16 kg/plant). These findings collaborate with the findings of earlier workers (Alam *et al.*, 1977; Singh and Srivastava, 1981; Chavan *et al.*, 1984; Verela *et al.*, 1988; Prabhakar and Shukla, 1990 and Varghese, 2001), who have reported that intercropping system gives more returns in comparison to monoculture system

Intercrops tried in this experiment showed complimentary and helping attitude towards the main crop in achieving higher productivity per unit area. At the same time interspaces between the main crops were covered by intercrops might have played a productive role in reducing the root knot nematode infestation and weed population. Intercrops were also given better conservation, accumulation and supply of available soil moisture throughout the crop period.

REFERENCES

- Alam M M, Saxena S K and Khan A M (1977).** Influence of intercultural marigold and margosa with some vegetable crops on plant growth and nematode population, *Act. Bot. Indica*, **5(1)**:33-39.
- Ahmed M (1995).** Study on the performance of Tomato + Batisak, Tomato + Cabbage and Batisak + Cabbage intercropping. *Agriculture of Bangladesh. J. of Agric. Res.*, **20(1)**: 47-51.
- Chavan T L, Khan A H, Joshi A T, Kelwal L and Kale P B (1984).** Intercropping in cole crops. *P. R. K. V. Res. J.*, **9**: 26-32.
- Kandoria J L, Singh Gurdeep, Singh Labh, Singh G and Singh L (1999).** Effect of intercropping cauliflower with tomato on the incidence of diamond back moth. *Ins. Envir.*, **5(3)**: 137-138.
- Nadal T R and Shrivastava V K (1986).** Intercropping in late grown cabbage. *Haryana J. of Hort. Sci.*, **15**:239.
- Prabhakar B S and Shukla V (1990).** Response of vegetable intercropping system to fertility regimes. *Proc. Int. Symp. Natural Resource Managment Sust. Agri.*, New Delhi, **1**: 203.
- Singh S and Srivastava V K (1981).** A note on economics of intercropping in autumn grown tomato. *Haryana J. Hort. Sci.*, **10**: 253.
- Sitaramiah K, Singh R S, Singh K P and Sikora R A (1971).** Plant parasitic and soil nematode of India. *G. B. P. U. A. & T. Exp. stat. Bull.*, **3**: 70.
- Varghese L (2001).** Indicators of production sustainability in intercropped vegetable farming on montmorillonitic soils in India. *J. Sust. Agric.*, **16**: 4-17.
- Verela, Ochoa G and Guharay F (1988).** The use of multiple cropping (cabbage-carrot) as component of Integrated Pest Management of cabbage defoliators, *Revista-Nicaragua de-Ento.*, **9**: 49-56.
