

Insect Pest Complex on Cauliflower (*Brassica oleracea* var *botrytis* L.) and their Correlation with Weather Parameters in Medziphema, Nagaland

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ABSTRACT

Field experiment was conducted to study the insect pest complex and their incidence on cauliflower during *rabi* season of 2021-2022 in the Entomological farm, SASRD, Medziphema, Nagaland. Fourteen insect pests were found to attack the crop at different stages of crop growth. Out of these, Green peach aphid, *Myzus persicae* and Cabbage butterfly, *Pieris* spp. were considered as major insect pests of cauliflower. The peak population of Green peach aphid (8.74 aphids/leaf) and Cabbage butterfly (4.10

larva /plant) was observed on 17th December and 12th February, respectively. The population of *Myzus persicae* showed a non-significant negative relation with maximum ($r = -0.320$) and minimum ($r = -0.311$) temperature, while positive relation with maximum ($r = 0.028$) and minimum ($r = 0.249$) relative humidity as well as rainfall ($r = 0.021$). The population of *Pieris* spp. showed a non-significant negative correlation with maximum ($r = -0.484$) temperature, whereas a significant negative correlation was observed with minimum ($r = -0.550$) temperature. Correlation of relative humidity with the incidence of *Pieris* spp. exhibited a non-significant negative correlation with maximum ($r = -0.078$) and minimum ($r = -0.162$) relative humidity, while rainfall exhibited a non-significant positive correlation ($r = 0.235$).

Keywords *Brassica oleracea*, *Myzus persicae*, *Pieris* spp., Correlation.

INTRODUCTION

Cauliflower is one of the most traditionally grown winter vegetables which prefers temperature of 15-21°C for their optimal growth and can withstand light frosts. It is grown in an area of 559.75 ha in Nagaland with a production of 3642.00 MT (Nagaland Statistical handbook 2021). According to Agricultural Ministry Annual Report 2017-18, India ranks second in production of cabbage and cauliflower in the world (Anonymous 2019). Among the cruciferous vegeta-

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bles, insect pest infestation is significantly higher in cauliflower, which results in severe reduction in the yield. One of the main reasons for low production and productivity of cauliflower is due to high cost of pesticides and attack by a variety of disease and pest (Imran 2018). According to Embaby and Lotfy (2015) the effect of weather factors on population dynamics of the most common pests of Cabbage were found to decrease if temperature decrease as a result of cooler climate as well as increasing the relative humidity. Bhat (2018) enlisted a total of 16 lepidopterous insect pest species of cole crops, out of which *Thysanoplusia orichalcea*, *Pieris brassicae*, *P. rapae*, *Plutella xylostella*, *Agrotis ipsilon* and *Helicoverpa armigera* were the abundant ones. Razaq *et al.* (2011) reported *Myzus persicae* as a major insect pest of *Brassica* crops although population of the *Brevicoryne brassicae* always remains larger than other species. The current studies on pest incidence of major insect pests of cauliflower would give an idea about their peak period of activity and would be helpful in developing pest management strategy against them.

MATERIALS AND METHODS

The field experiment was conducted in the experimental farm, Department of Entomology, School of Agricultural Sciences and Rural Development (SASRD), Nagaland University, Medziphema under Chumukedima district of Nagaland located at 23°45'53" N latitude and 93°52'04" E longitude at an elevation of 310 meters above the mean sea level. Cauliflower crop variety Madhuri was sown on 20th Oct, 2021 and transplanted on 19th Nov, 2021 in the main field. Three different plots were maintained to study the insect pest complex and their incidence on cauliflower. Five plants were randomly selected per plot and the insect pest population was counted and recorded at weekly interval right after transplanting till harvest. Population count of sap sucking insect pests was taken from 3 leaves i.e. top, middle and bottom per plant from 5 randomly selected plants from each plot. Leaf feeding insect pest such as cabbage caterpillar, diamond back moth, crucifer leaf webber, cabbage semi-looper, cabbage head borer were counted by inspecting 5 randomly selected plants from each plot. The coleopteran insect pest such as flea beetle was counted from five randomly selected plants from each

plot. Simple linear correlation analysis was performed to find out the relationship of weather parameters like temperature, relative humidity and rainfall with the incidence of insect pests of cauliflower.

RESULTS AND DISCUSSION

During the period of investigation, fourteen insect pests were observed in the field (Table 1). Out of these, two insect viz., Green peach aphid, *Myzus persicae* (Hemiptera: Aphididae) and Cabbage butterfly, *Pieris* spp. (Lepidoptera: Pieridae) were considered as a major insect pests as they were found in large numbers and injured the crop. The other insect pests such as Diamondback Moth, *Plutella xylostella*; Cabbage Aphids, *Brevicoryne brassicae*; Cabbage Head borer, *Hellula undalis*; Cabbage Looper, *Trichoplusia ni*; Cabbage Semilooper, *Thysanoplusia orichalcea*; Crucifer Leaf Webber, *Crociodolomia binotalis*; Flea Beetle, *Phyllotreta cruciferae*; Spinach Flea Beetle, *Phyllotreta cruciferae*; Termites, *Odontotermes obsus*; Slant Faced Grasshopper, *Atractomorpha* spp.; Whitefly, *Bemisia tabaci* and Tussock moth, *Orgyia detritia* were also observed feeding on cauliflower but considered as a minor importance as they were not in large numbers and not consistently present in the field for longer period.

Larinfeli *et al.* (2019) reported a total of 12 insect pests belonging to 4 insect orders viz., Lepidoptera (6), Coleoptera (2), Diptera (2), Hemiptera (2). Out of these, the most serious insect pests of crucifer crops found are large white Cabbage butterfly (*Pieris brassicae*), Green peach aphid (*Myzus persicae*) and Tobacco caterpillar (*Spodoptera litura*). Further, Diamondback moth (*Plutella xylostella*) was recognized to be one of the major insect pest of late planted cole crops. Striped flea beetle (*Phyllotreta striolata*), Leaf beetle (*Monolepta quadriguttata*), Cabbage looper (*Thysanoplusia orichalcea*), Cabbage stink bug (*Eurydema dominolus*), Small white Cabbage butterfly (*Pieris canidia*), Fruit fly (*Bactrocera tau*), Dipteran fly (*Allactoneura* sp) and Cabbage heart caterpillar (*Crociodolomia pavonana*) appeared to be minor pests. Similarly, Bhat (2018) found 16 lepidopterous insect pests species belonging to 5 families and 12 insect genera on cole crops. Of these, the most abundant ones are *Thysanoplusia orichalcea*, *Pieris brassicae*,

Table 1. Insect pests recorded on cauliflower during October 2021 to February 2022.

Sl. No.	Common name	Scientific name/Order/Family	Crop phenology	Feeding site
1	Green peach aphid	<i>Myzus persicae</i> (Hemiptera: Aphididae)	Vegetative stage till harvest	Leaf
2	Cabbage white butterfly	<i>Pieris</i> spp. (Lepidoptera: Pieridae)	Vegetative stage till harvest	Leaf
3	Diamond back moth	<i>Plutella xylostella</i> (Lepidoptera: Plutellidae)	Vegetative stage till harvest	Leaf
4	Cabbage aphids	<i>Brevicoryne brassicae</i> (Hemiptera: Aphididae)	Vegetative stage	Leaf
5	Cabbage head borer	<i>Hellula undalis</i> (Lepidoptera: Pyralidae)	Vegetative and head formation stage	Leaf and curd
6	Cabbage looper	<i>Trichoplusia ni</i> (Lepidoptera: Noctuidae)	Vegetative stage	Leaf
7	Cabbage semi looper	<i>Thysanoplusia orichalcea</i> (Lepidoptera: Noctuidae)	Vegetative stage	Leaf
8	Crucifer leaf webber	<i>Crociodolomia binotalis</i> (Lepidoptera: Pyralidae)	Vegetative stage	Leaf
9	Flea beetle	<i>Phyllotreta cruciferae</i> (Coleoptera: Chrysomelidae)	Vegetative stage till harvest	Leaf and curd
10	Spinach flea beetle	<i>Disonycha xanthomelas</i> (Coleoptera: Chrysomelidae)	Vegetative stage till harvest	Leaf and curd
11	Slant faced grasshopper	<i>Atractomorpha</i> spp. (Orthoptera: Acrididae)	Early seedling and vegetative stage	Leaf
12	Whitefly	<i>Bemisia tabaci</i> (Hemiptera: Aleyrodidae)	Vegetative stage	Leaf
13	Termites	<i>Odontotermes obesus</i> (Isoptera: Termitidae)	Early vegetative stage	Root
14	Tussock moth	<i>Orgyia detritia</i> (Lepidoptera: Lymandriidae)	Early vegetative stage	Leaf

Pieris rapae, *Plutella xylostella*, *Agrotis ipsilon* and *Helicoverpa armigera*. Das (2020) also observed *Plutella xylostella*, *Lipaphis erysimi*, *Pieris canidia*, *Athalia lugens proxima* and *Phyllotreta cruciferae* as major pests, while *Pieris rapae*, *Monolepta signata*, *Agrotis ipsilon*, *Spodoptera litura*, *Plusia orichalcea*, *Crociodolomia binotalis* and *Nazara viridula* as minor pests of brassicaceous ecosystem.

The incidence of Green peach aphid, *M. persicae* initially appeared on 26th November 2021 (48th SMW) with mean population of 3.80 per leaf and the

observation was taken once in a week. The highest population of *M. persicae* was recorded on 17th December 2021 (51st SMW) with a mean population of 8.74 per leaf (Table 2, Fig. 1). The results are comparable with the findings of Sain *et al.* (2017) who reported that the early population of aphid appeared on first week of November (44 SMW) and reached its peak throughout third week of December (50 SMW). Tolba (2020) observed that the activity of the Green peach aphid was first recorded on 22nd December (6.20 aphids/ plant) and reached its peak throughout first week of February (33.62 aphids/ plant) and last

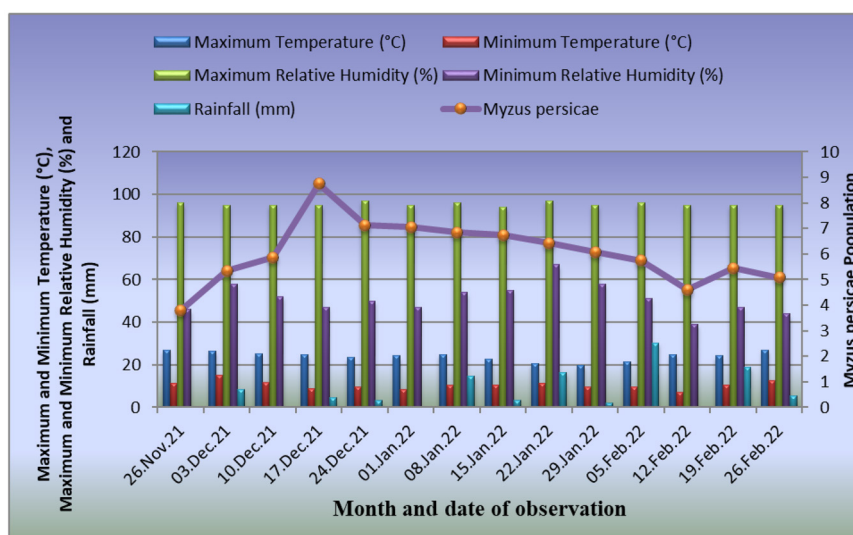
Table 2. Seasonal incidence of major insect pests of cauliflower during October, 2021 to February, 2022.

Standard Meteorological week (SMW)	Date of observation	Temperature		Relative humidity		Rainfall (mm)	<i>Myzus persicae</i> (No per leaf)	<i>Pieris spp.</i> (No per plant)
		(°C)		(%)				
		Max.	Min.	Max.	Min.			
48	26.Nov.21	26.90	11.40	96.00	46.00	0.00	3.80	1.06
49	03.Dec.21	26.40	15.20	95.00	58.00	8.50	5.33	1.23
50	10.Dec.21	25.30	11.60	95.00	52.00	0.00	5.86	1.33
51	17.Dec.21	24.90	8.90	95.00	47.00	4.70	8.74	1.40
52	24.Dec.21	23.40	9.70	97.00	50.00	3.20	7.12	1.53
1	01.Jan.22	24.20	8.50	95.00	47.00	0.00	7.06	1.63
2	08.Jan.22	24.90	10.30	96.00	54.00	14.80	6.84	1.80
3	15.Jan.22	22.40	10.60	94.00	55.00	3.40	6.74	2.10
4	22.Jan.22	20.70	11.40	97.00	67.00	16.40	6.43	2.33
5	29.Jan.22	19.80	9.50	95.00	58.00	2.10	6.07	2.73
6	05.Feb.22	21.50	9.70	96.00	51.00	30.20	5.74	2.93
7	12.Feb.22	24.70	7.20	95.00	39.00	0.00	4.60	4.10
8	19.Feb.22	24.10	10.60	95.00	47.00	18.90	5.44	2.20
9	26.Feb.22	26.90	12.70	95.00	44.00	5.40	5.07	1.90

week of January (48.76 aphids/ plant) toward bud and flowering stages.

The data presented in Table 2 and Fig. 2 revealed that the incidence of Cabbage butterfly, *Pieris spp.*

was first initiated on 26th November, 2021 (48th SMW) and the inspection was done once in a week. The Cabbage butterfly population was low at initial stage with a mean larval population of 1.06 per plant on 26th November (48th SMW) and attained the highest

**Fig. 1.** Incidence of Green peach aphids, *Myzus persicae* on cauliflower during October 2021 to February 2022.

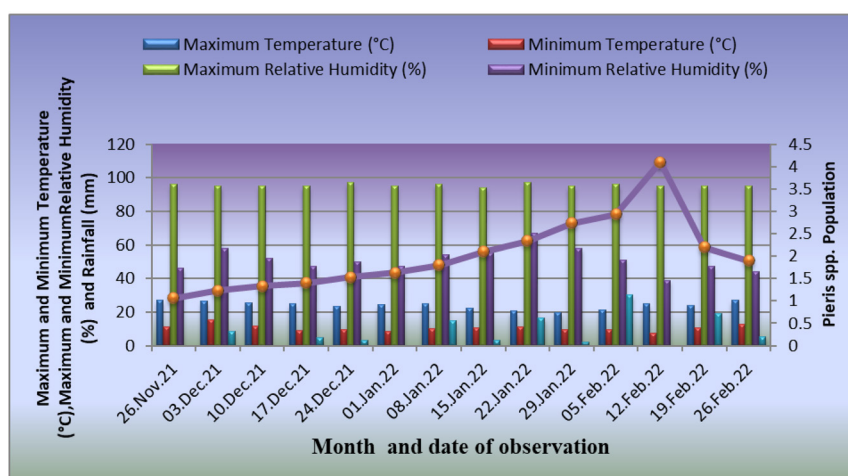


Fig. 2. Incidence of Cabbage butterfly, *Pieris* spp. on cauliflower during October 2021 to February 2022.

peak (4.10 per plant) on 12th February, 2022 (7th SMW). The present findings are in agreement with Sharma *et al.* (2017) who stated that *P. brassicae* was first observed on 43rd SMW (1.33 larvae/plant) and the population was maximum (5.74 larvae/plant) on 7th SMW.

Maximum ($r = -0.320$) and minimum ($r = -0.311$) temperature had a non-significant negative effect on the incidence of *M. persicae*. However, a non-significant positive correlation of the pest was observed with maximum ($r = 0.028$) and minimum ($r = 0.249$) relative humidity and rainfall ($r = 0.021$) (Table 3). The present findings are also in partial agreement with

Bhagat *et al.* (2018) who carried out the correlation analysis of aphids for two subsequent years (2015-16 and 2016-17) and shows a non-significant negative relationship with maximum ($r = -0.19$, $r = -0.31$) and minimum ($r = -0.15$, $r = -0.33$) temperature, while relative humidity ($r = 0.34$, $r = 0.39$) shows positive correlation with aphid population. Similarly, Pradhan *et al.* (2020) also stated that rainfall had non-significant positive correlation with aphid population ($r = 0.038$).

In case of cabbage butterfly, maximum ($r = -0.484$) temperature as well as maximum ($r = -0.078$) and minimum ($r = -0.162$) relative humidity had a non-significant negative correlation with the incidence of the pest. However, a significant negative correlation was observed with minimum ($r = -0.550$) temperature, while rainfall exhibited a non-significant positive correlation ($r = 0.235$) with the incidence of the pest (Table 3). Similarly, Sharma *et al.* (2017) also reported that minimum temperature had a significant negative correlation ($r = -0.631$) with the population of *Pieris brassicae*. Khan *et al.* (2017) also stated that the population of *P. brassicae* had a negative correlation with maximum ($r = -0.443$) and minimum ($r = -0.645$) relative humidity.

Table 3. Correlation coefficient (r) of major insect pests of cauliflower with weather parameters recorded during October 2021 to February 2022.

Pests	Pearson's correlation coefficient				
	Temperature (°C)		Relative humidity (%)		Rainfall (mm)
	Max	Min	Max	Min	
<i>Myzus persicae</i>	-0.320 ^{NS}	-0.311 ^{NS}	0.028 ^{NS}	0.249 ^{NS}	0.021 ^{NS}
<i>Pieris</i> spp.	-0.484 ^{NS}	-0.550*	-0.078 ^{NS}	-0.162 ^{NS}	0.235 ^{NS}

Note: $df = (14-2) = 12$ $r_{0.05} = 0.532$
 $r_{0.01} = 0.661$
 * = Significant at 5% level of significance.
 NS = Non-significant at 5% level of significance.

CONCLUSION

From the present investigation it can be concluded

that Green peach aphid and Cabbage butterfly were the major insect pests of cauliflower in the Medziphema area of Nagaland under Chumukidema district. The peak population of Green peach aphid (8.74 aphids/leaf) was recorded on 3rd week of December at maximum and minimum temperature of 24.90 and 8.90° C along with maximum and minimum relative humidity of 95 and 47.00%. The peak population of Cabbage butterfly (4.10 larva/plant) was recorded on 2nd week of February at maximum and minimum temperature of 24.70 and 7.20° C along with maximum and minimum relative humidity of 95 and 39.00%.

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