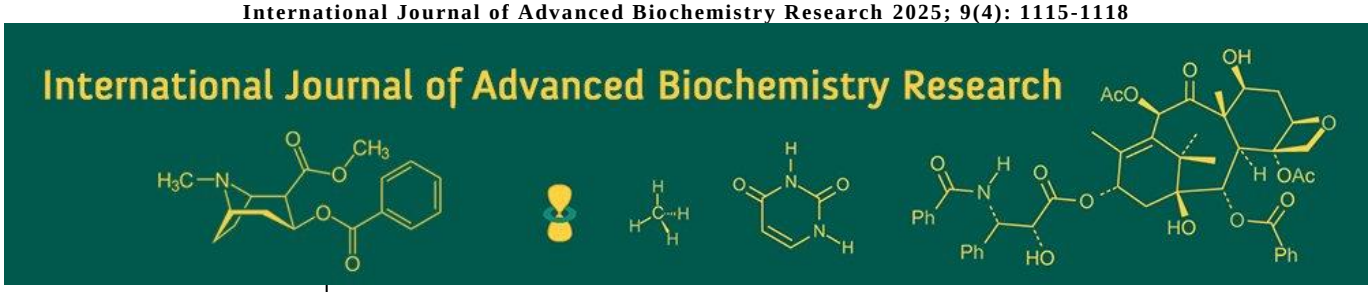

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Assessment of germplasms for their relative susceptibility against thrips (*Scirtothrips dorsalis* Hood) infesting chilli [*Capsicum annum* L.]

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Abstract
Investigations were carried out on "Assessment of germplasms for their relative susceptibility against thrips (*Scirtothrips dorsalis* Hood) infesting chilli [*Capsicum annum* L.]" at Instructional Farm, ASPEE College of Horticulture and Forestry, Regional Horticultural Research Station, Navsari Agricultural University, Navsari during 2017-18 and 2018-19. The results revealed that, maximum thrips population was found in GVC-121 (3.01/3 leaves) whereas, it remained maximum thrips population in GCH-3 (6.95/3 leaves). Likewise, maximum fruit yield was obtained in GAVC hybrid-1 (50.60 q/ha) it was minimum in GCH-3 (35.11 q/ha). Overall, GVC-121 and GVC-111 were grouped under highly resistant category with respect to susceptibility to thrips population. Similarly, GAVC hybrid-1 and GVC-101 were grouped in resistant category against thrips population. GAVC-112 and AVNPC-131 were grouped in the susceptible category against thrips population. Lastly, GCH-1 and GCH-3 were grouped in highly susceptible category against thrips population.

Keywords: Thrips, *Scirtothrips* dorsalis Hood, chilli, *Capsicum annum* L.

Introduction
Chilli (*Capsicum annum* L.) is a member of solanaceae family which represents a diverse plant group. The name is derived from Latin word "Capsa" that means "hallow pod". There are various biotic and abiotic factors responsible for reducing in yield of chilli. The insect pests being the major which in over 25 insects have been recorded attacking leaves and fruits of chilli in India, of which thrips (*Scirtothrips dorsalis* Hood), aphid (*Aphis gossypii* Glover) and mite (*Polyphagotarsonemus latus* Banks) are the considerable and important pests (Butani, 1976) [4]. In Gujarat, thrips, aphid, cutworm, whitefly and mites have been reported to infest the chilli crop. Thrips is one of the most serious pests causing about 60.5 to 74.3 percent yield loss of green chilli and considered as an important enemy of chillies. Thrips are also responsible for transmission of leaf curl disease locally known as "*kokadva*". In India and Sri Lanka, chilli suffers from a malady called "*murda*" with characteristic leaf curl symptoms. This "*murda*" syndrome has been attributed to the a ttack of a tiny tarsonemid mite (*Polyphagotarsonemus latus* Banks) and thrips (*Scirtothrips dorsalis* Hood). Both nymphs and adult thrips cause damage by scraping and lacerating leaf epidermis and suck the cell sap from leaves resulting in margin of the leaves rolled upwards and the leaf size reduced. In extreme conditions, the leaf colour turns bronze with sharp reduction in plant height. The yield loss due to chilli thrips ranges from 50-90 percent (Bagle, 1998) [2]. Overall, yield loss due to thrips and mite is estimated to the tune of 50 percent (Ahmed *et al.*, 1987) [1]. Apart from the sucking pests, the crop is also vulnerable to fruit borer viz., (*Helicoverpa armigera* Hubner), (Shivaramu and Kulkarni, 2001) [9] with 20-30 percent damage to chilli fruits by the pest.

Materials and Methods
Present investigation on "Assessment of germplasms for their relative susceptibility against thrips (*Scirtothrips dorsalis* Hood) infesting chilli [*Capsicum annum* L.]" was carried out at Instructional Farm, Regional Horticultural Research Station, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari during late *kharif* 2017-18 and 2018-19.

Experimental materials for the present investigation consisting of varieties of chilli (GVC-101, GVC-111, GVC-121, GAVC-112, AVNPC-131, GAVC hybrid-1) were obtained from the Main Vegetables Research Station, Anand Agricultural University, Anand and (GCH-1 and GCH-3) from Spices Research Station Jagudan, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar. For the purpose, eight varieties were grown in randomized block design replicated thrice. The varieties under test were kept unsprayed throughout the crop period and all other recommended agronomical practices were followed for raising the chilli crop.

Methods of recording observation

For this purpose, 5 plants were randomly selected and tagged from net plot area and the observations of thrips were recorded. The number of nymphs as well as adults were counted on three leaves (top, middle and bottom of each tagged plant). The observations were taken regularly at weekly interval starting from first week after transplanting till harvest.

Yield

Picking of green chilli fruits were carried out as and when fruits were ready for harvest. Picking wise yield of chilli fruits were recorded from each plot. Fruit yield of chilli in kg per plot was converted to q/ha.

Categorization of varieties

The chilli varieties were also grouped in the four categories of resistance to thrips viz., highly resistant, resistant, susceptible and highly susceptible based on thrips population. For the purpose, mean value of individual varieties (Xi) was compared with mean value of all varieties (X) and standard deviation (SD) following the modified scale adopted by Patel *et al.* (2002). The retransformed data were used for computation of X, Xi and SD in case of this parameter. The scale used for categorizing different varieties was as under.

Category of resistance	Scale of resistance
Highly resistant (HR)	Xi < X-SD
Resistant (R)	Xi < X-SD < X
Susceptible (S)	Xi < X-SD < (X + SD)
Highly susceptible (HS)	Xi > (X + SD) < (X + 2SD)

Results and Discussion

Thrips population

In the year 2017-18, significant differences were observed among the chilli varieties in thrips infestation. The lowest thrips population (1.89) was recorded in GVC-121, followed by GVC-111 (2.06) and GAVC hybrid-1 (2.22), indicating better tolerance to thrips. In contrast, the highest thrips population (2.88) was found in GCH-3, followed by GCH-1 (2.76) and AVNPC-131 (2.64), suggesting their high susceptibility. The resistance observed in GVC-121 and GVC-111 could be attributed to specific morphological features such as greater leaf thickness, smaller leaf area, and better canopy structure, which may create less favorable microclimates for thrips colonization, as supported by Patil *et al.* (2014) [7], who reported that increased leaf toughness acts as a mechanical barrier against thrips. Similarly, Yadav *et al.* (2013) [13] suggested that plant vigor and canopy architecture influence thrips resistance by modifying habitat suitability for pest buildup.

During 2018-19, the trend of thrips infestation remained consistent with the previous year. The lowest infestation (1.83) was again observed in GVC-121, followed by GVC-111 (1.95) and GAVC hybrid-1 (2.06). The highest thrips population (2.56) was found in GCH-3, followed by GCH-1 (2.47) and AVNPC-131 (2.37). The consistency of performance across both years reinforces the genetic stability of resistance traits in GVC-121 and GVC-111. According to Kamble *et al.* (2016) [6], varieties with poor vegetative growth and sparse canopy offer minimal physical hindrance to thrips, allowing easier infestation. Meanwhile, Choudhary and Patel (2017) [5] emphasized the role of early flowering in pest escape, which is evident in GVC-121, as early flowering may help the crop avoid peak thrips population periods.

The pooled data across both years confirmed that GVC-121 (1.86) was the most resistant variety to thrips, followed by GVC-111 (2.01) and GAVC hybrid-1 (2.14). The highest pooled thrips infestation was observed in GCH-3 (2.73), followed by GCH-1 (2.62) and AVNPC-131 (2.51). The consistency of varietal performance across years is further validated by the non-significant year × variety interaction, indicating that the varietal response to thrips remained stable under varying environmental conditions. The resistant varieties likely possess a combination of morphological (thick lamina, compact structure, fewer tender tissues) and phenological (early flowering) traits that deter thrips feeding and oviposition. This is in line with findings of Sharma *et al.* (2015) [8] and Singh *et al.* (2010) [10], who reported that thrips feeding on susceptible chilli varieties causes flower drop and fruit malformation, significantly reducing yield. Therefore, varieties like GVC-121 and GVC-111 are not only less affected by thrips but also serve as ideal candidates for resistant breeding and integrated pest management (IPM) strategies in chilli cultivation.

Table 1: Infestation to thrips on various chilli varieties

Varieties	2017-18	2018-19	Pooled
GVC-101	2.37 (5.14)	2.17 (4.25)	2.27 (4.70)
GVC-111	2.06 (3.80)	1.95 (3.34)	2.01 (3.57)
GVC-121	1.89 (3.13)	1.83 (2.89)	1.86 (3.01)
GAVC-112	2.51 (5.82)	2.28 (4.70)	2.39 (5.26)
AVNPC-131	2.64 (6.49)	2.37 (5.16)	2.51 (5.83)
GAVC hybrid-1	2.22 (4.47)	2.06 (3.80)	2.14 (4.14)
GCH-1	2.76 (7.16)	2.47 (5.61)	2.62 (6.39)
GCH-3	2.88 (7.84)	2.56 (6.07)	2.73 (6.95)
S.Em±(T)	0.15	0.13	0.09
C.D. at 5% (T)	0.45	0.39	0.26
S.Em±(Y x T)	-	-	0.14
C.D. at 5% (Y x T)	-	-	NS
CV (%)	10.56	10.10	10.36

Note: Figures in parentheses are retransformed values, those outside are $\sqrt{X + 0.5}$ transformed values

Yield

In 2017-18, the chilli variety GAVC hybrid-1 recorded the highest fruit yield (49.06 q/ha), followed closely by GAVC-112 (47.29 q/ha) and GVC-121 (44.24 q/ha). These high-yielding varieties also showed moderate to low thrips infestation in the corresponding year, indicating that reduced pest pressure directly contributes to improved productivity. On the other hand, GCH-3 (32.61 q/ha) and GCH-1 (34.99 q/ha) registered the lowest yields, which can be correlated with their high thrips population (7.84 and 7.16, respectively), as discussed earlier. This negative trend

between pest infestation and yield supports the findings of Singh *et al.* (2010) [10] and Sharma *et al.* (2015) [8], who reported that thrips feeding during early flowering and fruiting stages leads to flower drop, poor fruit development, and significant yield loss.

The yield trend remained consistent in 2018-19. The highest yield (52.13 q/ha) was again recorded in GAVC hybrid-1, followed by GAVC-112 (50.09 q/ha) and GVC-121 (47.98 q/ha). Notably, GVC-121, which had the lowest thrips population (2.89/3 leaves) in 2018-19, also ranked among the top three for yield, reinforcing the concept that thrips resistance is linked to higher productivity. In contrast, GCH-3 and GCH-1, which suffered from high thrips infestation, produced the lowest yields (37.62 and 39.69 q/ha, respectively). These results demonstrate a consistent and inverse relationship between thrips pressure and yield across both seasons, as also emphasized by Kamble *et al.* (2016) [6] and Yadav *et al.* (2013) [13], who linked pest resistance traits with sustained yields in chilli.

Across both years, the pooled yield data reaffirmed that GAVC hybrid-1 produced the highest average fruit yield (50.60 q/ha), followed by GAVC-112 (48.69 q/ha) and GVC-121 (46.11 q/ha). These varieties maintained moderate or low thrips incidence, indicating a stable resistance-tolerance mechanism that supported productivity under biotic stress. On the contrary, GCH-3 (35.11 q/ha) and GCH-1 (37.34 q/ha) remained the least productive varieties, both of which also had the highest pooled thrips populations (6.95 and 6.39, respectively). The non-significant year × treatment interaction (Y × T) suggests that varietal yield performance was consistent across seasons, highlighting the genetic stability and environmental adaptability of superior varieties. These findings are in agreement with Choudhary and Patel (2017) [5] and Bhosle *et al.* (2011) [3], who concluded that integrating morphological resistance with good yield potential is a key strategy in developing chilli varieties suitable for integrated pest management (IPM) programs.

Table 2: Fruit yield recorded in different chilli varieties

Varieties	Yield (q/ha)		
	2017-18	2018-19	Pooled
GVC-101	39.74	43.84	41.79
GVC-111	42.13	45.91	44.02
GVC-121	44.24	47.98	46.11
GAVC-112	47.29	50.09	48.69
AVNPC-131	37.38	41.76	39.57
GAVC hybrid-1	49.06	52.13	50.60
GCH-1	34.99	39.69	37.34
GCH-3	32.61	37.62	35.11
S.Em±(T)	2.27	2.64	1.57
C.D. at 5% (T)	6.88	8.01	4.50
S.Em±(Y x T)	-	-	2.46
C.D. at 5% (Y x T)	-	-	NS
CV (%)	9.60	10.19	9.94

Categorization of different varieties

Based on the pooled mean thrips population, chilli varieties were classified into four resistance categories. GVC-121 (3.01) and GVC-111 (3.57) were categorized as Highly Resistant (HR), showing consistently low thrips infestation likely due to traits like thick leaf lamina, smaller leaf area, and longer internodes, which act as barriers to thrips. Similar findings were reported by Patil *et al.* (2014) [7] and Bhosle *et al.* (2011) [3]. GAVC hybrid-1 (4.14) and GVC-101 (4.70) fell under the Resistant (R) group, maintaining good yields despite moderate thrips populations, indicating tolerance, a concept supported by Yadav *et al.* (2013) [13]. GAVC-112 (5.26) and AVNPC-131 (5.83) were Susceptible (S), likely due to broader leaf area and weaker vegetative growth, which create favorable microhabitats for thrips, as observed by Kamble *et al.* (2016) [6]. GCH-1 (6.39) and GCH-3 (6.95) were classified as Highly Susceptible (HS), showing both high thrips counts and low yield, confirming a strong negative impact of thrips, consistent with reports by Sharma *et al.* (2015) [8] and Singh *et al.* (2010) [10]. This classification clearly highlights GVC-121 and GVC-111 as promising varieties for thrips management in chilli.

Table 3: Categorization of different varieties against thrips infesting chilli.

Category of resistance	Scale	Variety ($\bar{X}i$)	
1	2	3	
Based on thrips population: $\bar{X}$ = 4.98 and SD = 1.38			
Highly resistant (HR)	$\bar{X}i$<3.60	GVC-121 GVC-111	(3.01) (3.57)
Resistant (R)	$\bar{X}i$> 3.60 <4.98	GAVC hybrid-1 GVC-101	(4.14) (4.70)
Susceptible (S)	$\bar{X}i$> 4.98<6.36	GAVC-112 AVNPC-131	(5.26) (5.83)
Highly susceptible (HS)	$\bar{X}i$> 6.36<7.74	GCH-1 GCH-3	(6.39) (6.95)

Conclusion

The variety GVC-121 recorded the lowest thrips population across both years, followed by GVC-111, indicating strong resistance. In contrast, GCH-3 consistently showed the highest thrips population, classifying it as highly susceptible. GAVC hybrid-1 consistently recorded the highest fruit yield in both years, showing good tolerance to moderate thrips pressure. The lowest yield was observed in GCH-3, confirming the negative impact of high thrips infestation on productivity. Based on pooled thrips data, GVC-121 and GVC-111 were categorized as Highly Resistant, GAVC hybrid-1 and GVC-101 as Resistant, GAVC-112 and AVNPC-131 as Susceptible, and GCH-1 and GCH-3 as Highly Susceptible to thrips under field conditions.

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