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Evaluation of Mulberry Varieties / Germplasms for Yellow Mite, *Polyphagotarsonemus latus* (Banks) Infestation

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Abstract: ***The experiment conducted for the evaluation of mulberry varieties for yellow mite, Polyphagotarsonemus latus (Banks) infestation and basis of their reaction on 100 germplasm entries (including breeding lines and cultivated varieties) available in the experimental block of Department of Sericulture at GKVK, Bengaluru at quarterly interval from October 2019 to January 2021 (6 intervals viz., October 2019, January 2020, April 2020, July 2020, October 2020 and January 2021). Yellow mites remained abundant almost equally on all entries and most of the entries (97 entries) harboured a greater number of mites (> 50 mites/ cm2 leaf area), while only three entries (AR - 12, KPG - 1 and ME 018) recorded relatively a smaller number of mites (<50 mites).***

Keywords: Yellow mite, *Polyphagotarsonemus latus,* mulberry, germplasm, evaluation

1. Introduction

Mulberry (*Morus* spp.) is a fast growing, woody tree species of Moraceae family with perennial nature and origin in Himalayan hills of India and China (Soo - ho *et al.*, 1990; Vijayan, 2010; Khan *et al*., 2013; Yuan and Zhao, 2017; Rohela *et al*., 2020). Moraceae, also known as the mulberry or fig family. It is a family of flowering plants of more than twenty - four species with one subspecies and at the minimum hundred identified varieties. It is an economical and widespread woody plant and has an enormous economic value other than sericulture leading to its several unique and special features. *Morus alba* (white mulberry), *Morus nigra* (black mulberry) and *Morus rubra* (red mulberry) are all commonly accepted worldwide species of genus Morus as they exhibit maximum medicinal properties. Among all the species, *M. alba* is a dominant species (Ercisli and Orhan, 2007). The yellow mite, *Polyphagotarsonemus latus (*Banks) usually attacks on the lower surface of small terminal tender leaves and on the medium sized younger leaves. Female lays the eggs on the lower surface of leaves. The tiny yellow mite colonizes and feeds on the lower surface of leaves and when their population increases they may enters the upper surface of leaves even and cause severe damage (Fig.1 and 2). The nymphs and adult mites are sap feeders and use their stylet like chelicerae for piercing and sucking the sap content from the young leaves causing leaf margins to curl and effect on the leaf moisture content of the leaves and becomes brittle, shrivelled, curled, dwarfed, thickened and puckered. Internodes may be short, giving plants a stunted appearance and the mite injects toxins during their feeding (Karmakar, 1995). Leaf curl caused by mites is serious and yield losses due to yellow mites are estimated to be 50 per cent. Under favourable weather situations, the yield loss due to yellow mite may go up to 96.39 per cent, sometimes leading to complete crop failure. The study was conducted to evaluate of mulberry varieties/germplasms for yellow mite, *Polyphagotarsonemus latus* (Banks) infestation, and the results are presented herein.

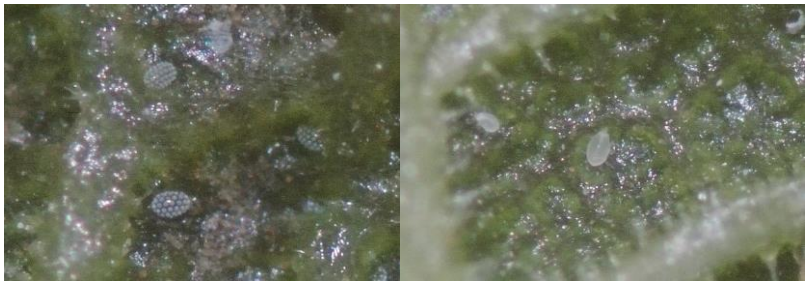
2. Materials and Methods

Evaluation of mulberry varieties for yellow mite, *Polyphagotarsonemus latus* (Banks) infestation and basis of their reaction were studied by recording mite infestation on 100 germplasm entries (including breeding lines and cultivated varieties) available in the experimental block of Department of Sericulture at GKVK, Bengaluru (Fig.3). The mulberry germplasm entries used in this study are listed in Table 1. The incidence of yellow mite was recorded at quarterly interval from October 2019 to January 2021 (6 intervals *viz*., October 2019, January 2020, April 2020, July 2020, October 2020 and January 2021). The yellow mite population density was recorded from randomly selected top five leaves from each entry and observed under a stereobinocular microscope to record the number of mites, including eggs and active stages on each of the entire leaf. Data of mite population from five leaves were pooled to compute the mean mite population. The mite population was expressed as mean number per entire leaf as well as mean number cm^2 leaf area and analysed statistically to compare mite infestation across the germplasm entries.

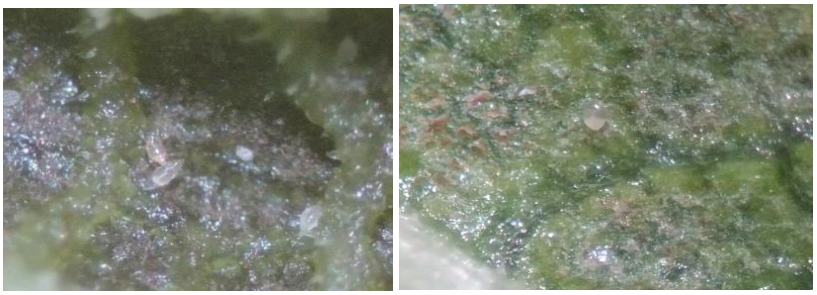
At each interval the germplasm entries were grouped according to the range of number of mites (eggs + active stages) /cm^2 leaf recorded as 0 – 25 mites, 26 – 50 mites, 51 – 75 mites, 76–100 mites and more than 100 mites. The percentage of entries / germplasms under each group was computed and compared interval - wise.

Table 1: Mulberry varieties / germplasm entries screened for yellow mite, *Polyphagotarsonemus latus* (Banks) infestation at GKVK, Bengaluru

Sl. No.	Mulberry germplasm entries	Sl. No.	Mulberry germplasm entries
1	ME - 06	51	*M. indica*
2	ME – 01	52	RFS – 135
3	ME – 84	53	C – 20
4	ME – 27	54	ME – 238
5	ME – 08	55	S – 34
6	ME – 67	56	Arsambola
7	ME – 18	57	V - 1
8	ME – 018	58	MR – 2
9	ME – 03	59	M – 5
10	ME – 52	60	Mysore local
11	ME – 95	61	MI – 0497
12	ME – 86	62	MI – 0573
13	ME – 107	63	ME – 052
14	ME – 05	64	MI – 556
15	ME – 65	65	MI – 245
16	Srinagar local	66	MI – 238
17	ME – 07	67	MI – 232
18	ME – 140	68	AR – 12
19	*M. cathyana*	69	ME – 149
20	*M. multicaulis*	70	MI – 228
21	ME - 228	71	ME – 185
22	*M. macrora*	72	ME – 224
23	C – 776	73	ME – 47
24	Karanahalli	74	MI – 139
25	Vishwa/ DD	75	MI – 231
26	Lonavale	76	MI – 524
27	S – 1635	77	MI – 516
28	S – 54	78	MI – 517
29	S – 36	79	MI – 506
30	DD – 1	80	MI – 32
31	S – 13	81	MI – 491
32	ME – 182	82	MI – 494
33	T – 33	83	MI – 564
34	T – 4	84	S – 34
35	T – 29	85	MI – 515
36	T – 9	86	MI – 178
37	T - 3	87	T – 31
38	MI – 143	88	Lingamala
39	MI – 04	89	Doddahalale
40	MI – 017	90	MI – 0799
41	MI – 169	91	KPG – 1
42	MI – 11	92	Gajapathipur – 3
43	MI – 66	93	Sabbawala – 2
44	MI – 240	94	Kumbrayur
45	MI – 012	95	Kava - 2
46	MI – 014	96	Maldara
47	MI - 79	97	Dhar local
48	MI – 143	98	IC - 313765
49	*M. alba*	99	IC - 313779
50	C - 763	100	MI – 0160



Eggs Larva



Adult male carrying quiescent female nymph Adult female

Figure 1: Developmental stages of yellow mite, *Polyphagotarsonemus latus* (Banks)

Figure 2: Yellow mite infested mulberry plants

Figure 3: A view of mulberry germplasms in the experimental block of Department of Sericulture at GKVK campus, Bengaluru

3. Results and Discussion

It is evident that the yellow mite remains active all through the year on all the mulberry germplasm entries evaluated in the present study. However, in the beginning of a calendar year *i. e.*, during January, the mean mite population correspond to category III (51 – 75 mites/cm^2 leaf area) with the actual mite population record of 66.32 mites/cm^2 leaf area. The mite population density record in the next quarter *i. e.*, during April, correspond to category II (26 – 50 mites/cm^2 leaf area) with the actual mite population record of 37.42 mites/cm^2 leaf area. Mite population trend in following quarters (July and October) was on the increasing side (70.83 and 98.05 mites/cm^2 leaf area, respectively) correspondingly falling in III and IV categories. Considering the higher mean mite abundance recorded across 100 germplasm entries during III quarter ending July coincided with the rainy season (kharif season). Hence, it is inferred as the period of peak mite

activity and the reaction of the mulberry germplasms to mite infestation during this period may be more realistic. Considering this, it is apparent that most of the germplasm entries *i. e.*, 99 entries harboured a greater number of mites. *i. e.*, 76–100 mites or more than 100 mites/ cm^2 leaf area and correspond to category IV or V. Only one entry recorded relatively a smaller number of mites *i. e.*, 26 – 50 mites and corresponds to category II (Table 2 and Fig.4).

Perusal of yellow mite population recorded from 100 mulberry germplasm entries across four quarterly intervals *viz.*, October (I), January (II), April (III) and July (IV) revealed the activity of yellow mites at all the intervals. The highest activity was during the IV quarter (July) with the mite population density of 98.05 mites/ cm^2 leaf area followed by quarter III (70.83 mites), quarter I (66.09 to 66.32 mites) and quarter II (37.42 to 37.71 mites) (Table 3).

Table 2: Grouping of mulberry germplasm entries (number of entries) based on the population density of yellow mite, *Polyphagotarsonemus latus* (Banks)

Month & Year	No. of mites/cm^2 leaf area				
	Up to - 25 (Category - I)	26 - 50 (Category - II)	51 - 75 (Category - III)	76 - 100 (Category - IV)	> 100 (Category - V)
October 2019	01	09	62	27	01
October 2020	01	08	66	24	01
January 2020	17	68	15	00	00
January 2021	23	57	18	02	00
April 2020	00	03	64	33	00
July 2020	00	01	00	65	34

No literature is available on the reaction of mulberry varieties/germplasms to yellow mite infestation in India and other countries, where host plant mulberry is used for rearing silkworms. Yellow mite is a polyphagous pest, known to infest and damage at least 250 cultivated crops in India and abroad. The major crops are chilli (*Capsicum* spp.), apple, avocado, cantaloupe, castor, citrus, coffee, cotton, brinjal, grapes, guava, jute, mango, papaya, pear, potato, sesame, beans, tea, tomato *etc*. (Pena and Campbell, 2005). Hence, information available on the reaction of germplasms/varieties of other major crops (potato, chilli, *Bt* cotton, *etc*.) to yellow mite infestation are compared and discussed.

Rani (2001) studied the reaction of true potato seed (TPS) varieties to yellow mite infestation and observed varying reaction among the varieties evaluated. Kufri Jyothi variety recorded maximum number of mites (158.83 – 168.50 mites/leaf), while TPS 1/16 recorded the lowest number of mites (22.33/leaf). Chilli crop being the major host of *P. latus*, evaluation of chilli germplasm lines for *P. latus* infestation has been studied at large like Khalid (2001) (77 cultivars), Desai *et al*. (2007) (21 lines), Bala *et al*. (2015) (44 lines), Ramesh *et al.* (2015) (71 lines), Bhattacharjee and Rahman (2017) (30 lines) and Monika *et al*. (2022) (14 lines). Chilli entries like, Pusa Jwala, RHRC erect and ACG - 77 by Desai *et al*. (2007), BCCH - SL - 4 (IC564032) and SBD - 1 - 1 by Bala *et al*. (2015), LIC 19, LCA 312, YAN and five other accessions by Khalid (2001), IC342390, IC572492, IC337281 and IC344366 by Ramesh *et al.* (2015), CH/09/8A3, 11/CHIVAR - 6, 10/ CHIVAR - 6, 10/ CHIVAR - 3 and 3 others by Bhattacharjee and Rahman (2017), 10/CHIhyb - 7 and 10/CHI Hyb - 6 by Monika *et al*. (2022) have been reported to record low mite infestation.

Kamruzzaman *et al*. (2013) screened four varieties of jute and reported that the highest fiber yield loss due to mite infestation was found in the variety OM - 1 (74.71%) followed by O - 795 (72.98%), O - 72 (68.14%) and the lowest was in O - 9897 (50.11%) and the highest seed yield loss in O - 795 (64.34%) followed by O - 72 (48.21%), OM - 1 (44.55%), the lowest was in O - 9897 (42.69%) under net house condition.

Biradarpatil *et al*. (2020), who evaluated 20 *Bt* cotton genotypes recorded low population of yellow mite on genotypes Chaitanya and Soumya.

Table 3: Population density of yellow mite, *Polyphagotarsonemus latus* (Banks) (no. of mites/cm^2 leaf area) on different mulberry germplasms at Bengaluru (GKVK campus)

Sl. No.	Germplasm	October 2019	January 2020	April 2020	July 2020	October 2020	January 2021	Mean
1	ME - 06	83.12	44.20	77.91	85.52	86.35	43.26	**70.06**
2	ME – 01	84.16	32.12	67.14	90.41	81.44	39.44	**65.79**
3	ME – 84	85.08	34.51	65.42	89.03	89.46	31.23	**65.79**
4	ME – 27	59.14	17.72	75.91	91.41	53.71	14.11	**52.00**
5	ME – 08	59.96	23.13	74.00	102.02	54.27	28.49	**56.98**
6	ME – 67	60.03	23.54	62.82	89.86	67.48	21.17	**54.15**
7	ME – 18	53.36	31.95	68.68	89.90	57.13	34.26	**55.88**
8	ME – 018	56.88	16.92	63.74	86.38	53.49	19.14	**49.43**
9	ME – 03	64.02	33.10	72.00	88.71	61.11	36.28	**59.20**
10	ME – 52	64.12	33.34	66.18	86.72	61.74	34.82	**57.82**
11	ME – 95	66.93	34.22	63.89	88.00	63.45	39.35	**59.31**
12	ME – 86	67.05	44.53	61.57	90.12	63.26	41.30	**61.31**
13	ME – 107	67.15	21.14	61.93	86.36	65.61	20.44	**53.77**
14	ME – 05	67.21	26.85	61.85	96.00	61.44	24.78	**56.36**
15	ME – 65	50.22	21.58	61.70	118.26	51.12	24.31	**54.53**
16	Srinagar local	50.44	46.40	62.62	89.36	56.70	42.96	**58.08**

17	ME – 07	50.98	32.50	62.55	89.24	53.17	36.94	**54.23**
18	ME – 140	51.06	46.72	65.28	85.39	52.76	44.48	**57.62**
19	*M. cathyana*	68.04	32.25	64.04	90.81	62.20	37.42	**59.13**
20	*M. multicaulis*	68.17	34.98	64.59	93.64	67.74	44.11	**62.21**
21	ME - 228	98.28	59.36	76.16	90.23	81.86	56.19	**77.01**
22	*M. macrora*	68.96	19.54	69.51	89.16	62.33	17.87	**54.56**
23	C – 776	69.02	31.11	80.25	90.30	63.21	34.23	**61.35**
24	Karanahalli	61.04	31.49	63.99	87.63	64.70	34.15	**57.17**
25	Vishwa/ DD	71.15	24.37	61.47	95.51	68.44	29.20	**58.36**
26	Lonavale	62.01	20.93	64.23	92.36	61.35	23.71	**54.10**
27	S – 1635	66.18	25.15	78.70	97.14	71.22	29.24	**61.27**
28	S – 54	80.17	45.61	85.12	123.28	83.17	43.82	**76.86**
29	S – 36	76.16	24.36	64.33	93.96	70.28	31.15	**60.04**
30	DD – 1	78.02	30.53	65.94	120.04	84.22	33.93	**68.78**
31	S – 13	70.94	34.44	83.66	107.72	72.40	29.36	**66.42**
32	ME – 182	63.25	37.19	66.37	94.16	68.34	39.91	**61.54**
33	T – 33	82.14	25.77	73.99	100.72	87.66	36.25	**67.76**
34	T – 4	77.41	29.26	66.91	93.04	73.19	23.26	**60.51**
35	T – 29	78.13	26.71	73.56	88.16	74.64	21.11	**60.39**
36	T – 9	80.92	30.30	67.34	92.00	87.30	34.74	**65.43**
37	T - 3	81.06	17.45	64.13	99.76	86.26	16.43	**60.85**
38	MI – 143	83.05	30.72	73.48	86.23	87.21	34.27	**65.83**
39	MI – 04	76.26	17.18	63.62	92.24	83.42	22.38	**59.18**
40	MI – 017	51.26	16.54	74.60	94.50	56.44	19.72	**52.18**
41	MI – 169	67.32	35.16	70.04	104.61	61.15	32.44	**61.79**
42	MI – 11	62.11	25.41	73.57	91.07	63.72	21.76	**56.27**
43	MI – 66	63.02	25.59	66.12	92.89	62.28	27.21	**56.19**
44	MI – 240	75.92	35.77	70.11	103.99	79.27	39.10	**67.36**
45	MI – 012	51.11	40.13	64.89	97.44	57.25	43.34	**59.03**
46	MI – 014	69.23	26.40	67.22	91.25	66.10	28.26	**58.08**
47	MI - 79	54.28	37.71	66.02	104.22	52.44	33.45	**58.02**
48	MI – 143	67.94	37.95	72.17	100.61	61.26	31.31	**61.87**
49	*M. alba*	55.26	65.89	65.54	119.70	52.19	62.28	**70.14**
50	C - 763	71.36	40.37	71.79	96.54	74.11	42.86	**66.17**
51	*M. indica*	72.02	38.75	71.80	96.85	71.22	43.24	**65.65**
52	RFS – 135	102.12	69.73	74.76	90.56	94.64	54.50	**81.05**
53	C – 20	54.03	37.44	78.00	99.37	51.40	34.25	**59.08**
54	ME – 238	72.91	35.38	67.24	96.78	67.26	38.62	**63.03**
55	S – 34	70.96	35.56	84.22	111.46	71.98	37.16	**68.56**
56	Arsambola	70.22	22.72	66.25	97.35	73.10	28.34	**59.66**
57	V - 1	93.02	74.30	88.24	131.21	101.26	79.42	**94.58**
58	MR – 2	55.24	16.74	76.29	92.12	54.14	21.16	**52.62**
59	M – 5	69.95	26.98	81.91	95.94	74.26	32.17	**63.54**
60	Mysore local	75.05	39.61	73.86	120.85	81.27	36.28	**71.15**
61	MI – 0497	86.16	48.79	61.63	99.66	82.48	44.41	**70.52**
62	MI – 0573	69.81	70.12	74.07	86.61	63.19	77.34	**73.52**
63	ME – 052	74.12	27.66	71.23	104.56	78.22	24.26	**63.34**
64	MI – 556	73.12	50.33	64.45	104.64	75.94	56.78	**70.88**
65	MI – 245	70.08	53.17	65.38	95.28	71.25	54.24	**68.23**
66	MI – 238	70.12	43.50	68.50	121.07	74.43	46.55	**70.70**
67	MI – 232	55.13	51.51	78.14	102.95	57.30	56.41	**66.91**
68	AR – 12	20.84	12.14	25.36	37.93	19.74	07.23	**20.54**
69	ME – 149	56.05	52.92	79.00	103.00	53.92	53.24	**66.36**
70	MI – 228	71.06	37.95	80.12	91.31	74.65	25.37	**63.41**
71	ME – 185	71.16	32.53	80.53	96.62	74.26	24.28	**63.23**
72	ME – 224	73.08	38.56	81.04	103.34	75.21	24.65	**65.98**
73	ME – 47	76.08	36.47	82.72	106.00	77.40	32.12	**68.47**
74	MI – 139	80.09	33.74	80.33	104.37	84.09	32.64	**69.21**
75	MI – 231	75.82	47.58	76.84	104.79	71.81	43.46	**70.05**
76	MI – 524	58.11	49.95	78.55	105.08	53.46	46.21	**65.23**
77	MI – 516	72.20	48.39	77.79	100.94	76.44	44.22	**70.00**
78	MI – 517	60.14	51.36	80.07	108.05	63.22	56.80	**69.94**
79	MI – 506	85.15	27.10	77.24	97.10	83.60	26.44	**66.11**
80	MI – 32	75.10	54.35	76.04	112.06	74.24	51.77	**73.93**
81	MI – 491	77.06	51.91	77.06	119.82	71.33	52.45	**74.94**
82	MI – 494	77.17	56.96	78.13	104.44	72.95	57.24	**74.48**
83	MI – 564	54.98	43.74	79.50	96.943	50.11	48.95	**62.37**

84	S – 34	60.92	27.37	76.73	116.96	63.32	24.41	**61.62**
85	MI – 515	52.70	59.38	85.94	105.51	56.44	54.12	**69.02**
86	MI – 178	85.24	50.99	62.76	96.15	86.77	54.78	**72.78**
87	T – 31	59.05	59.93	81.17	96.29	54.48	52.46	**67.23**
88	Lingamala	53.93	63.95	77.16	107.24	57.15	69.14	**71.43**
89	Doddahalale	57.80	40.57	85.82	121.33	52.40	42.43	**66.73**
90	MI – 0799	85.92	40.71	86.04	107.87	81.36	47.21	**74.85**
91	KPG – 1	27.33	18.75	48.66	91.86	31.11	12.42	**38.36**
92	Gajapathipur – 3	42.15	50.19	62.33	92.50	43.72	47.30	**56.37**
93	Sabbawala – 2	46.08	37.64	74.90	109.35	42.24	34.24	**57.41**
94	Kumbrayur	53.96	44.36	66.34	86.74	49.46	51.74	**58.77**
95	Kava - 2	54.14	48.10	72.55	101.48	57.23	54.25	**64.63**
96	Maldara	47.45	41.59	47.47	99.39	46.14	46.61	**54.78**
97	Dhar local	34.22	50.52	54.18	92.21	28.46	54.43	**52.34**
98	IC - 313765	66.91	41.18	75.41	91.10	61.21	43.22	**63.17**
99	IC - 313779	52.23	38.93	66.62	89.96	52.15	33.27	**55.53**
100	MI – 0160	43.66	29.96	73.65	102.84	44.13	25.25	**53.25**
Mean		**66.32**	**37.42**	**70.83**	**98.05**	**66.09**	**37.71**	**62.74**

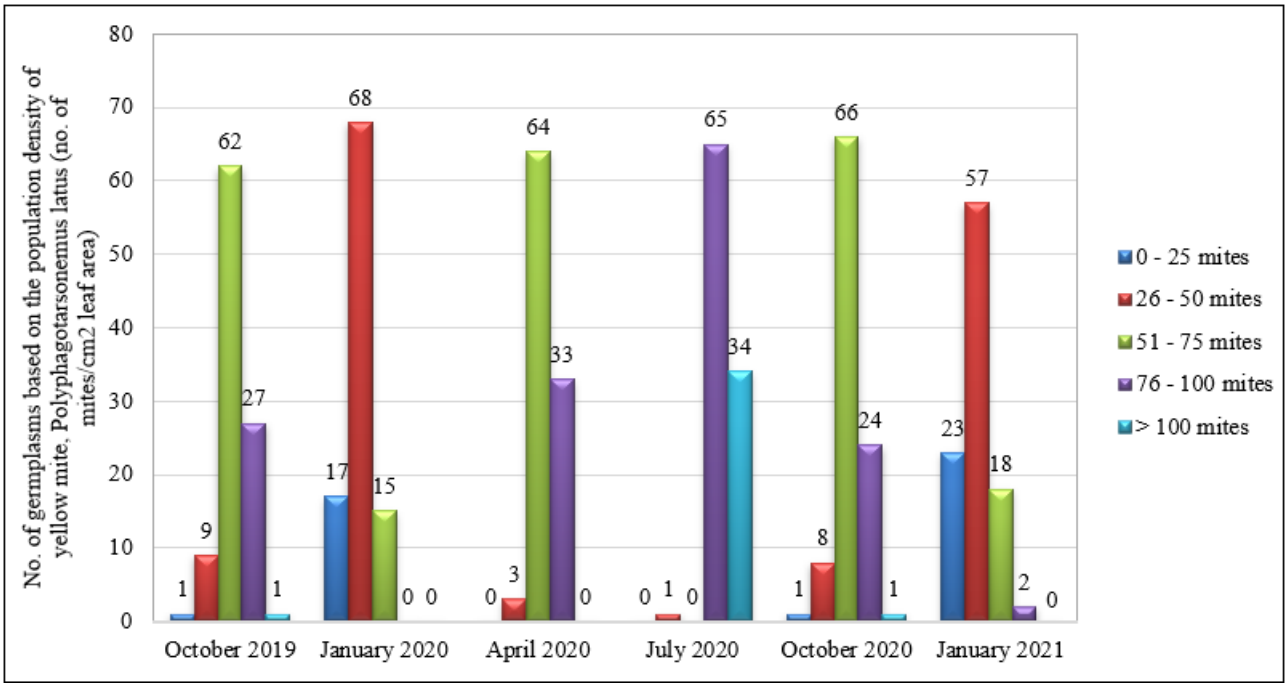


Figure 4: Grouping of mulberry germplasms based on the population density of yellow mite, *Polyphagotarsonemus latus* (Banks) (no. of mites/cm^2 leaf area)

4. Conclusion

One hundred mulberry germplasm entries were evaluated for yellow mite infestation at GKVK, Bengaluru by recording mite population at quarterly interval from October 2019 to January 2021 (six intervals). Yellow mites remained abundant almost equally on all entries and most of the entries (97 entries) harboured a greater number of mites (> 50 mites/ cm^2 leaf area), while only three entries (AR - 12, KPG - 1 and ME 018) recorded relatively a smaller number of mites (<50 mites).

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References

[1] Bala, S. C., Karmakar, K. and Ghosh, D. K., 2015, Field evaluation of chilli germplasms against yellow mite, *Polyphagotarsonemus latus* (Banks) (Acari - Tarsonemidae) and its management under gangetic basin of West Bengal. *Environ. Ecol.*, **33** (4C): 2031 - 2035.

[2] Biradarpatil, K. A., Prabhu, S. T. and Ravikumar, M. R., 2020, Screening of different *Bt* cotton genotypes against yellow mite, *Polyphagotarsonemus latus* (Banks) and biochemical basis of resistance. *Int. J. Curr. Microbiol. App. Sci.*, **9** (1): 1555 - 1569.

[3] Bhattacharjee, S. and Rahman, S., 2017, Screening of certain chilli germplasm against yellow mite, *Polyphagotarsonemus latus (*Banks). *Internat. J. Plant Protec.*, **10** (2): 320 - 323,

[4] Desai, H. R., Bhandania, K. A., Rai, A. B., Patel, A. J. and Patel, M. B., 2007, Assessment of yield loss and resistance of yellow mite, *Polyphagotarsonemus latus*

Banks in chilli. *Vegetable Science*, **34** (1): 46 - 50.

[5] Ercisli, S. and Orhan, E., 2007, Chemical composition of white (*Morus alba*), red (*Morus rubra*) and black (*Morus nigra*) mulberry fruits. *Food Chem*., **103**: 1380–1384.

[6] Kamruzzaman, A. S. M., Alam, M. Z. and Miah, M. R. U., 2013, Effect of yellow mite, *Polyphagotarsonemus latus* (Banks) density on hosts (*Corchorus olitorius* L.) phenology and assessment of yield loss under net house condition. *African J. Agri. Res.*, **8** (4): 380 - 385.

[7] Karmakar, K., 1995, Comparative symptomology of chilli leaf curl disease and biology of tarsonemid mite, *Polyphagotarsonemus latus* (Banks) (Acari: Tarsonemidae). *Annals of Entomology*, **13**: 65 - 70.

[8] Khalid, A., 2001, Resistance in chilli cultivars to yellow mite, *Polyphagotarsonemus latus* (Banks). *Indian J. Agri. Res*., **35** (2): 95 - 99.

[9] Khan, M. A., Rahman, A. A., Islam, S., Khandokhar, P., Parvin, S., Islam, M. B., Hossain, M., Rashid, M., Sadik, G., Nasrin, S., Mollah, M. N. and Alam, A. H., 2013, A comparative study on the antioxidant activity of methanolic extracts from different parts of *Morus alba* L. (Moraceae). *BMC Res. Notes* 6, 24.

[10] Monika, J., Rachna, G., Sonika, K., Asha, P. and Batra, V. K., 2022, Evaluation of chilli germplasm against, yellow mite, *Polyphagotarsonemus latus* (Banks) (Acari: Tarsonemidae). *J. Appl. Entomol*., **2** (1): 06 - 09.

[11] Peña, J. E. and Campbell, C. W., 2005, Broad mite. EDIS. http: //edis. ifas. ufl. edu/CH020.

[12] Ramesh, K., Pandravada, S. R., Sivaraj, N., Sararth B. B. and Chakrabarty, S. K., 2015, Screening chilli (*Capsicum annuum* L.) genotypes for resistance to broad mite, *Polyphagotarsonemus latus* (Banks) and analysing the geographic distribution of resistance. *Electr. J. Pl. Breed*., **6** (4): 928 - 937.

[13] Rani, H., 2001, Bioecology of yellow mite, *Polyphagotarsonemus latus (*Banks) infesting potato (*Solanum tuberosum* L.) and chilli (*Capsicum annum* L.). M. Sc. (Ag.) Thesis, University of Agricultural Sciences, Bangalore, p.135.

[14] Rohela, G. K., Phanikanth, J., Mir, M. Y., Aftab, A. S., Pawan, S., Sadanandam, A. and Kamili, A. N., 2020, Indirect regeneration and genetic fidelity analysis of acclimated plantlets through SCoT and ISSR markers in *Morus alba* L. cv. *Chinese white*. *Biotech. Rep*., **25**: 313–321.

[15] Soo - Ho, L., Young - Taek, K., Sang - Poong, L., In - Jun, R., Jungsung, L. and Byung - Ho, L., 1990, *Sericulture Training Manual*. FAO, Roma, p.117 FAO Agric. Services Bulletin. No.80.

[16] Vijayan, K., 2010, The emerging role of genomic tools in mulberry (*Morus* spp.) genetic improvement. *Tree Genet. Genomes*, **6**: 613–625.

[17] Yuan, Q. and Zhao, L., 2017, The Mulberry (*Morus alba* L.) Fruit - A review of characteristic components and health benefits. *J. Agric. Food Chem*., **65**: 10383–10394.