The Pharma Innovation Journal 2023; SP-12(12): 2286-2290

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(12): 2286-2290

www.thepharmajournal.com
Received: 01-11-2023
Accepted: 03-12-2023

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Trapping efficiency of different coloured sticky traps against sucking pests of pulse crops

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Abstract
Pulses are mainly attacked by sucking pests and the colour sticky traps are the effective as well as environment friendly tool used to manage them. Considering this, the experiment in factorial randomized block design was conducted in field of College of Agriculture, Latur, Maharashtra during *kharif* 2022-2023 to evaluate five different colour i.e. green, white, blue, red, yellow sticky traps in three pulse crops *viz*., black gram, cowpea and green gram. Observations on sucking pests and natural enemies were recorded at 10 days interval. White was the most effective colour with respect to management of aphid followed by yellow, blue green and red. While blue was most attractive colour for leafhoppers followed by white, green, red and yellow. White and blue found to be equally effective against thrips followed by green, yellow and red traps. Maximum whiteflies were trapped on yellow colour followed by green, white, red and blue trap. For all the sucking pests, maximum population was trapped on traps which were installed in green gram plots while minimum was found in cowpea and black gram.

Keywords: Black gram, cowpea, green gram, sticky trap, sucking pests

Introduction
Pulses, the food legumes, have been grown by farmers since millennia providing nutritionally balanced food to the people of India (Nene, 2006) [29] and many other countries in the world. The protein content of pulses is about 22–24%, which is almost twice the protein content in wheat and thrice that of rice (Gowda *et al*., 2013) [9]. Pulses enriches soil health due to the root nodules fixing atmospheric nitrogen in soil. Pulses are good source of minerals, such as iron, zinc and magnesium.

Biotic factors like insect and pests are the major constraints in achieving the potential yield of pulses. The sucking pests which were earlier recognized as minor pests in pulses with lesser economic significance are attaining a status of major pests (Saxena *et al*., 2018) [21].

Aphids (*Aphis craccivora*) are polyphagous and important pest of many pulse crops and are distributed throughout the country. Nymphs and adults suck the sap from underside of the leaves, top shoots, stem, flowers, buds, and developing pods. Leafhoppers (*Empoasca kerri*) are distributed throughout India feeding on mungbean and urdbean (Chhabra and Kooner, 1981) [5]. Yield losses between 10 and 35% were recorded under heavy leafhopper infestation in cowpea lines (Singh and Tripathi, 1987) [22]. Thrips (*Megalurothrips distalis*) have great affection for the flowers of papilionaceous plants, mungbean being the most preferred host plant. (Kooner *et al*., 1983; Lal, 1985) [11, 12]. Nymphs and adults feed on stigma inside the flower and flowers get devitalized and fall prematurely (Verma *et al*., 1980) [26]. Whiteflies (*Bemisia tabaci)* are distributed along southern and northern parts of the country (Srivastava and Singh, 2009) [30]. Apart from direct sap feeding damage, it also acts as a vector for Gemini viruses which causes yellow mosaic disease in pulses. Among the pulses, urdbean is the most preferred crop followed by mungbean, ricebean, and pigeonpea (Nene, 1972; Murugesan and Chelliah, 1978) [19, 18].

Pulse productivity and quality has been severely threatened by increasing difficulties in managing these sucking pests due to their ability to evolve resistance to insecticides, resurgence and their secondary outbreak due to indiscriminate and injudicious application of synthetic insecticides. So the management of these sucking pests with chemical insecticides is neither eco-friendly nor recommended. Installation of yellow sticky traps at 1-2 traps per 50-100 m2 slightly above crop canopy helps to bring down the active flying adult populations of whiteflies, leafhoppers in green gram, black gram and cowpea. (Srinivasan, 2014) [24].

So to ensure better pest management we should adopt these physical methods. It costs only up

to Rs. 10 for preparation of single trap at farm level. So it is very convenient to farmers to adopt it.

Materials and Methods

Five different colour (Green, White, Blue, Red, Yellow) drawing sheets were purchased from the market. These sheets were cut into 20cm (height) x 15 cm (width) size pieces and lamination was done. Laminated traps were smeared with commercial grease. Traps were installed in the field seven days after germination of the crop using bamboo sticks. One trap per treatment plot was installed. Also, care was taken that the height of the trap was one feet above the crop canopy, throughout the experimentation. Observations were recorded on all the sucking pests and natural enemies at 10 days interval. After recording the observations at 10 days interval, the sticking agent was cleaned from the laminated trap with the help of cotton cloth and again the same traps were used for further observations by applying sticky agent.

Results

The mean data revealed that maximum numbers of aphids were trapped on white trap i.e. 56.66 aphids/trap followed by yellow, blue, green traps which recorded 56.11, 48.86 and 44.42 aphids/trap, respectively. Least numbers were caught on red trap (43.33 aphids/trap). The mean data pertaining to incidence of aphid with respect to different pulse crops revealed that highest aphid count was observed on green gram which is 88.20 aphids per plant while the lowest number of aphids were recorded from cowpea. The mean data pertaining to interaction of trap colour and pulse crops showed that yellow trap in cowpea attracted more aphids i.e.58.46 aphids/trap which was found at par with yellow trap in green gram, yellow trap in black gram, blue trap in black gram, white trap in black gram and blue trap in cowpea which attracted 57.6, 52.26, 52.99, 51.73 and 51.46 aphids/trap, respectively.

The mean data regarding the leafhopper catches on traps revealed that blue colour trap attracted maximum of 1.02 leafhoppers /trap followed by white, green, red which attracted 0.91, 0.82 and 0.77 leafhoppers/trap, respectively. Least leafhoppers were trapped on yellow trap. The mean data of leafhopper infestation on different pulse crops showed that highest number of leafhoppers i.e.1.01 leafhoppers/trap were found on green gram and lowest numbers i.e. 0.64 leafhoppers/trap were found on black gram. The interaction study showed that most effective interaction for management of leafhopper was white trap in green gram which attracted 1.53 leafhoppers/trap and it was found at par with blue trap in green gram attracting 1.40 leafhopper/trap followed by white trap in black gram which attracted 1.20 leafhoppers/trap, blue trap in cowpea and green trap in cowpea, both of which attracted 1.06 leafhoppers/trap. Least numbers of leafhopper were caught on yellow trap in green gram.

White was the most effective colour with respect to thrips catches (10.26 thrips/trap) followed by green, blue, yellow and red which attracted 10.02, 9.93, 4.31 and 3.91 thrips/trap, respectively. A highest mean of 8.20 thrips/trap were observed on green gram while the lowest count of 7.00 thrips/ trap was recorded from cowpea. Interaction of trap colour and the pulse crops showed that maximum number of thrips i.e. 12.40 thrips/trap were caught on white trap in black gram followed by blue trap in green gram (11.06 thrips/trap), green trap in cowpea, green trap in green gram, blue trap in black gram and white trap in green gram which attracted 10.80, 10.46, 10.13 and 9.93 thrips/trap, respectively.

Yellow was found as most effective trap colour by recording maximum of 2.99 whiteflies/trap. It is followed by green, white, red and blue which recorded 0.88, 0.73, 0.73 and 0.53 whiteflies/trap, respectively. Maximum number of whiteflies i.e. 1.39 whiteflies/trap were found on green gram while least number of 0.84 whiteflies/trap were recorded from black gram. Interaction of trap colour and pulse crops revealed that highest numbers of whiteflies (3.60 /trap) were trapped on yellow colour trap in cowpea. However, it was found at par with yellow trap in green gram, yellow trap in black gram each of which attracted 2.73 whiteflies/trap and green trap in green gram and blue trap in cowpea, red trap in green gram, white trap in green gram, white trap in black gram and red trap in black gram which attracted 3.06, 1.86, 1.33, 1.00, 0.93, 0.93 and 0.80 whiteflies/trap, respectively.

Discussion

The present findings are in accordance with those of Webb *et al*. (1993) [31] who reported that *A. craccivora* was caught more often in yellow traps as compared to green traps in watermelon plants. Similarly, Vaishampayan *et al*. (1975) [25] and Southwood (1978) [23] reported that yellow was the most efficient colour used in trapping insects such as homopteran, hymenopteran, dipteran and thysanopteran compared to other colours. Roth *et al*. (2016) [20] also reported similar result indicating yellow sticky color traps more effective for aphid.

The blue colour found most suitable for capturing the leafhopper followed by green, red and white. Also, in present study green colour found to be second best treatment with respect to leafhopper management. The above results keeps close relation with the results reported by Murtaza *et al*. (2019) [17] showing green traps as most effective for trapping highest jassids population. Also the green trap was found second most effective for jassid capture (12.40±0.99) by Lashari *et al.* (2021) [13] in the mustard crop and same findings with green colour were observed by Wagan *et al.* (2019) [27] in Okra who noticed 14.92 jassids/green card and minimum capture was found on yellow colour card (26.34 jassids/trap).

Devi and Roy (2017) [7] indicated that thrips were attracted to blue as well as white colour. Blue traps caught significantly more thrips than white ones (Liu and Chu, 2005) [14]. Numerous other reports also indicated that thrips were attracted to blue as well as white colour traps (Brodsgaard, 1993) [1]. Blue traps were the most attractive to *Thrips fuscipennis* and *T. tabaci*, followed by yellow and white trap (Maria *et al*. 2020) [16]. Blue and white sticky traps were reported as an effective monitoring tool for *F. bispinosa* in citrus by Childers and Brecht (1996) [6]. Blue was reported to be most attractive color to *F. intonsa* in a balsam pear field (Chen *et al.* 2017) [4]. Present findings are in line with the findings of all above workers.

Study results reported by Wagan *et al*. (2017) [32] revealed that the highest population of whitefly was observed on yellow sticky cards and the green sticky trap was the second strongest attractant of whitefly in okra, supported the present findings. Yellow sticky traps are widely used to monitor for the presence of whiteflies (Gerling and Horowitz, 1984; Byrne *et al*. 1995; Hoelmer and Simmons, 2008) [8, 33, 10]. Lu *et al.* (2012) [15] reported that yellow sticky traps can be used as an effective method for the control of whiteflies, *B. tabaci* in the greenhouse. More or less similar results are obtained in present study.

Table 1: Effect of different colour sticky trap on total catches of aphid population on pulse crops

Treatments	15 DAI	30 DAI	45 DAI	60 DAI	75 DAI	Mean
Factor 'A'						
T_1	69.56	118.56	33.56	3.56	5.89	44.42
(Green)	(8.33)	10.89)	(5.82)	(2.10)	(2.57)	(5.94)
T_2	90.78	141.22	42.89	2.89	5.56	56.66
(white)	(9.39)	(11.87)	(6.45)	(1.91)	(2.55)	(6.5)
T_3	71.33	118.89	42.22	8.78	3.11	48.86
(Blue)	(8.44)	(10.92)	(6.49)	(3.01)	(2.00)	(6.17)
T_4	65.33	97.89	39.00	10.33	4.11	43.33
(Red)	(8.13)	(9.90)	(6.21)	(3.11)	(2.18)	(5.90)
T_5	89.44	149.22	29.56	8.11	4.22	56.11
(Yellow)	(9.35)	(12.25)	(5.40)	(2.79)	(2.27)	(6.41)
SEm+	0.26	0.23	0.50	0.27	0.15	
CD	0.87	0.77	NS	0.89	NS	
Factor 'B'						
C1	70.60	127.20	38.80	6.67	3.87	49.42
(black gram)	(8.42)	(11.25)	(6.21)	(2.59)	(2.16)	(6.12)
C2	73.07	117.47	40.80	5.60	4.73	48.33
(Cowpea)	(8.54)	(10.81)	(6.36)	(2.47)	(2.36)	(6.10)
C3	88.20	130.80	32.73	7.93	5.13	52.95
(Green gram)	(9.24)	(11.43)	(5.65)	(2.70)	(2.42)	(6.28)
SEm+	0.30	0.22	0.20	0.15	0.09	
CD	NS	NS	NS	NS	NS	

Table 2: Effect of different colour sticky trap on total catches of leafhopper population on pulse crops

Treatments	15 DAI	30 DAI	45 DAI	60 DAI	75 DAI	Mean
Factor 'A'						
T_1	0.22	0.00	2.44	0.78	0.67	0.82
(Green)	(1.09)	(1.00)	(1.81)	(1.28)	(1.25)	(1.28)
T_2	0.44	0.44	2.78	0.22	0.67	0.91
(white)	(1.18)	(1.18)	(1.84)	(1.09)	(1.24)	(1.30)
T_3	0.11	0.67	3.67	0.67	0.00	1.02
(Blue)	(1.04)	(1.21)	(2.13)	(1.21)	(1.00)	(1.31)
T_4	0.33	0.00	2.33	0.00	1.22	0.77
(Red)	(1.12)	(1.00)	(1.78)	(1.00)	(1.42)	(1.26)
T_5	0.22	0.56	0.89	0.56	0.22	0.49
(Yellow)	(1.09)	(1.19)	(1.29)	(1.21)	(1.09)	(1.17)
SEm+	0.04	0.06	0.09	0.06	0.03	
CD	NS	NS	0.29	NS	0.11	
Factor 'B'						
C1	0.27	0.13	2.00	0.13	0.67	0.64
(black gram)	(1.11)	(1.05)	(1.64)	(1.05)	(1.23)	(1.21)
C2	0.40	0.33	2.20	0.53	0.33	0.75
(Cowpea)	(1.15)	(1.11)	(1.73)	(1.18)	(1.13)	(1.26)
C3	0.13	0.53	3.07	0.67	0.67	1.01
(Green gram)	(1.05)	(1.18)	(1.94)	(1.24)	(1.24)	(1.08)
SEm+	0.04	0.06	0.08	0.07	0.07	
CD	NS	NS	0.23	NS	NS	

Table 1: Continued

Interaction 'AxB'						
T_1C1	82.00	130.33	35.33	2.67	5.00	51.06
(Green, Black gram)	(9.10)	(11.41)	(5.94)	(1.91)	(2.44)	(6.16)
T_1C2	61.67	94.33	38.00	5.00	5.00	40.8
(Green, Cowpea)	(7.80)	(9.75)	(6.24)	(2.42)	(2.44)	(5.73)
T_1C3	65.00	131.00	27.33	3.00	7.67	46.8
(Green, Green gram)	(8.10)	(11.47)	(5.29)	(1.98)	(2.82)	(5.93)
T_2C1	70.00	147.33	33.00	3.67	4.67	51.73
(White,Black gram)	(8.41)	(12.17)	(5.64)	(2.15)	(2.37)	(6.14)
T_2C2	68.00	111.33	57.33	1.00	5.00	48.53
(White, Cowpea)	(8.29)	(10.53)	(7.63)	(1.38)	(2.44)	(6.05)
T_2C3	134.33	165.00	38.33	4.00	7.00	69.73
(White, Green gram)	(1.4)	(12.87)	(6.09)	(2.20)	(2.82)	(5.07)
T_3C1	73.33	133.00	46.33	8.33	4.00	52.99
(Blue, Black gram)	(8.61)	(11.57)	(6.86)	(3.03)	(2.20)	(6.45)
T_3C2	76.33	116.33	52.00	10.00	2.67	51.46
(Blue, Cowpea)	(8.69)	(10.80)	(7.25)	(3.29)	(1.91)	(6.38)
T_3C3	64.33	107.33	28.33	8.00	2.67	42.13
(Blue, Green gram)	(8.02)	(10.38)	(5.35)	(2.70)	(1.91)	(5.67)
T_4C1	67.33	84.33	38.33	3.67	1.67	39.06
(Red, Black gram)	(8.26)	(9.17)	(6.24)	(2.13)	(1.57)	(5.47)
T_4C2	70.33	103.00	27.33	5.33	6.00	42.39
(Red, Cowpea)	(8.44)	(10.17)	(5.24)	(2.48)	(2.60)	(5.78)
T_4C3	58.33	106.33	51.33	22.00	4.67	48.53
(Red, Green gram)	(7.69)	(10.35)	(7.15)	(4.73)	(2.37)	(6.45)
T_5C1	60.3	141.00	41.00	15.00	4.00	52.26
(Yellow, Black gram)	(7.69)	(11.91)	(6.36)	(3.70)	(2.22)	(6.31)
T_5C2	89.00	162.33	29.33	6.67	5.00	58.46
(Yellow, Cowpea)	(9.46)	(12.78)	(5.46)	(2.76)	(2.42)	(6.57)
T_5C3	119.00	144.33	18.33	2.67	3.67	57.6
(Yellow, Green gram)	0.91)	(12.05)	(4.39)	(1.91)	(2.15)	(4.28)
SEm+	0.61	0.47	0.62	0.39	0.23	
CD	1.85	1.43	1.98	1.23	NS	

Table 2: Continued

Interaction 'AxB'						
T_1C1	0.00	0.00	2.00	0.00	0.00	0.40
(Green, Black gram)	(1.00)	(1.00)	(1.65)	(1.00)	(1.00)	(1.13)
T_1C2	0.67	0.00	3.00	0.67	1.00	1.06
(Green, Cowpea)	(1.27)	(1.00)	(1.95)	(1.27)	(1.38)	(1.37)
T_1C3						1.00
(Green, Green gram)	0.00 (1.00)	0.00 (1.00)	2.33 (1.82)	1.67 (1.57)	1.00 (1.38)	(1.35)
T_2C1	0.67	0.67	4.00	0.00	0.67	1.20
(White,Black gram)	(1.27)	(1.27)	(2.22)	(1.00)	(1.27)	(1.40)
T_2C2	0.00	0.00	0.00	0.00	0.00	0.00
(White, Cowpea)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
T_2C3	0.67	0.67	4.33	0.67	1.33	1.53
(White, Green gram)	(1.27)	(1.27)	(2.30)	(1.27)	(1.47)	(1.51)
T_3C1	0.00	0.00	3.00	0.00	0.00	0.60
(Blue, Black gram)	(1.00)	(1.00)	(1.95)	(1.00)	(1.00)	(1.19)
T_3C2	0.33	0.00	3.00	2.00	0.00	1.06
(Blue, Cowpea)	(1.13)	(1.00)	(1.98)	(1.65)	(1.00)	(1.35)
T_3C3	0.00	2.00	5.00	0.00	0.00	1.4
(Blue, Green gram)	(1.00)	(1.65)	(2.44)	(1.00)	(1.00)	(1.41)
T_4C1	0.00	0.00	1.00	0.00	2.67	0.73
(Red, Black gram)	(1.00)	(1.00)	(1.38)	(1.00)	(1.88)	(1.25)
T_4C2	1.00	0.00	2.33	0.00	0.00	0.66
(Red, Cowpea)	(1.38)	(1.00)	(1.82)	(1.00)	(1.00)	(1.24)
T_4C3	0.00	0.00	3.67	0.00	1.00	0.93
(Red, Green gram)	(1.00)	(1.00)	(2.15)	(1.00)	(1.38)	(1.30)
T_5C1						0.26
(Yellow, Black gram)	0.67 (1.27)	0.00 (1.00)	0.00 (1.00)	0.67 (1.27)	0.00 (1.00)	(1.10)
T_5C2	0.00	1.67	2.67	0.00	0.67	1.00
(Yellow, Cowpea)	(1.00)	(1.57)	(1.88)	(1.00)	(1.27)	(1.34)
T_5C3						0.20
(Yellow, Green gram)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	1.00 (1.38)	0.00 (1.00)	(1.07)
SEm+	0.09	0.12	0.17	0.14	0.14	
CD	0.28	0.38	0.52	NS	0.43	

Table 3: Effect of different colour sticky trap on total catches of thrips population on pulse crops

Treatments	15 DAI	30 DAI	45 DAI	60 DAI	75 DAI	Mean
Factor 'A'						
T_1	2.00	0.22	44.22	3.67	0.00	10.02
(Green)	(1.62)	(1.09)	(6.63)	(2.01)	(0.00)	(2.27)
T_2	1.11	0.67	45.89	3.67	0.00	10.26
(white)	(1.41)	(1.23)	(6.45)	(1.97)	(0.00)	(2.21)
T_3	1.89	4.33	33.11	10.33	0.00	9.93
(Blue)	(1.60)	(1.82)	(5.71)	(3.18)	(0.00)	(2.46)
T_4	0.67	0.00	16.67	2.22	0.00	3.91
(Red)	(1.27)	(1.00)	(3.70)	(1.73)	(0.00)	(1.63)
T_5	0.33	0.22	17.44	3.56	0.00	4.31
(Yellow)	(1.13)	(1.09)	(4.10)	(1.92)	(0.00)	(1.64)
SEm+	0.91	0.19	0.87	0.28	0.00	
CD	NS	NS	NS	0.93	0.00	
Factor 'B'						
C1	1.07	0.27	32.13	5.87	0.00	7.86
(black gram)	(1.37)	(1.11)	(5.43)	(2.34)	(0.00)	(2.05)
C2	1.60	0.53	28.60	4.27	0.00	7.00
(Cowpea)	(1.55)	(1.19)	(4.97)	(2.14)	(0.00)	(1.97)
C3	0.93	2.47	33.67	3.93	0.00	8.20
(Green gram)	(1.29)	(1.44)	(5.56)	(2.01)	(0.00)	(2.06)
SEm+	0.08	0.14	0.37	0.18	0.00	
CD	NS	NS	NS	NS	0.00	

Table 3: Continued

Interaction 'AxB'						
T_1C1	0.67	0.00	38.00	5.33	0.00	8.80
(Green, Black gram)	(1.27)	(1.00)	(6.05)	(2.30)	(0.00)	(2.12)
T_1C2	2.00	0.67	50.33	1.00	0.00	10.80
(Green, Cowpea)	(1.65)	(1.27)	(7.13)	(1.38)	(0.00)	(2.28)
T_1C3	3.33	0.00	44.33	4.67	0.00	10.46
(Green, Green gram)	(1.94)	(1.00)	(6.70)	(2.36)	(0.00)	(2.40)
T_2C1	1.00	0.00	60.33	0.67	0.00	12.40
(White,Black gram)	(1.38)	(1.00)	(7.65)	(1.27)	(0.00)	(2.26)
T_2C2	1.67	2.00	35.33	3.33	0.00	8.46
(White, Cowpea)	(1.57)	(1.71)	(5.16)	(2.07)	(0.00)	(2.10)
T_2C3	0.67	0.00	42.00	7.00	0.00	9.93
(White, Green gram)	(1.27)	(1.00)	(6.55)	(2.56)	(0.00)	(2.27)
T_3C1	2.67	0.67	30.33	17.00	0.00	10.13
(Blue, Black gram)	(1.82)	(1.27)	(5.55)	(4.23)	(0.00)	(2.57)
T_3C2	3.00	0.00	32.00	8.00	0.00	8.60
(Blue, Cowpea)	(2.00)	(1.00)	(5.65)	(2.91)	(0.00)	(2.31)
T_3C3	0.00	12.33	37.00	6.00	0.00	11.06
(Blue, Green gram)	(1.00)	(3.20)	(5.94)	(2.41)	(0.00)	(2.51)
T_4C1	0.67	0.00	9.67	3.67	0.00	2.80
(Red, Black gram)	(1.27)	(1.00)	(3.21)	(2.09)	(0.00)	(1.51)
T_4C2	0.67	0.00	13.33	1.00	0.00	3.00
(Red, Cowpea)	(1.27)	(1.00)	(3.34)	(1.38)	(0.00)	(1.39)
T_4C3	0.67	0.00	27.00	2.00	0.00	5.93
(Red, Green gram)	(1.27)	(1.00)	(4.56)	(1.73)	(0.00)	(1.71)
T_5C1	0.33	0.67	22.33	2.67	0.00	5.20
(Yellow, Black gram)	(1.13)	(1.27)	(4.68)	(1.81)	(0.00)	(1.77)
T_5C2	0.67	0.00	12.00	8.00	0.00	4.13
(Yellow, Cowpea)	(1.27)	(1.00)	(3.55)	(2.94)	(0.00)	(1.75)
T_5C3	0.00	0.00	18.00	0.00	0.00	3.60
(Yellow, Green gram)	(1.00)	(1.00)	(4.06)	(1.00)	(0.00)	(1.41)
SEm+	0.24	0.32	1.11	0.44	0.00	
CD	NS	0.99	NS	1.37	0.00	

Table 4: Effect of different colour sticky trap on total catches of whitefly population on pulse crops

Treatments	15 DAI	30 DAI	45 DAI	60 DAI	75 DAI	Mean
Factor 'A'						
T_1	0.22	1.33	1.78	0.44	0.67	0.88
(Green)	(1.09)	(1.40)	(1.50)	(1.15)	(1.23)	(1.27)
T_2	0.00	0.56	2.56	0.22	0.33	0.73
(white)	(1.00)	(1.21)	(1.77)	(1.09)	(1.12)	(1.23)
T_3	0.22	0.67	0.44	0.67	0.67	0.53
(Blue)	(1.12)	(1.21)	(1.17)	(1.21)	(1.21)	(1.18)
T_4	0.56	0.22	1.44	0.89	0.56	0.73
(Red)	(1.09)	(1.08)	(1.49)	(1.34)	(1.20)	(1.24)
T_5	0.78	5.22	3.44	3.44	2.11	2.99
(Yellow)	(1.46)	(2.41)	(1.99)	(1.97)	(1.68)	(1.90)
SEm+	0.47	0.08	0.12	0.06	0.07	
CD	0.15	0.29	0.41	0.19	0.25	
Factor 'B'						
C1	0.27	1.33	1.13	0.80	0.67	0.84
(black gram)	(1.26)	(1.37)	(1.35)	(1.26)	(1.23)	(1.54)
C2	0.20	1.53	2.33	1.27	1.13	1.29
(Cowpea)	(1.00)	(1.44)	(1.66)	(1.39)	(1.36)	(1.37)
C3	0.60	1.93	2.33	1.33	0.80	1.39
(Green gram)	(1.20)	(1.58)	(1.74)	(1.41)	(1.29)	(1.44)
SEm+	0.08	0.11	0.10	0.13	0.07	
CD	NS	NS	0.32	NS	NS	

Table 4: Continued

Interaction 'AxB'						
T_1C1	0.00	0.00	0.00	0.00	0.00	0.00
(Green, Black gram)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
T_1C2	0.00	0.00	4.00	0.00	0.00	0.8
(Green, Cowpea)	(1.00)	(1.00)	(2.05)	(1.00)	(1.00)	(1.21)
T_1C3	0.67	4.00	1.33	1.33	2.00	1.86
(Green, Green gram)	(1.27)	(2.21)	(1.47)	(1.47)	(1.71)	(1.62)
T_2C1	0.00	0.00	4.67	0.00	0.00	0.93
(White, Black gram)	(1.00)	(1.00)	(2.37)	(1.00)	(1.00)	(1.27)
T_2C2	0.00	1.00	0.00	0.67	0.00	0.33
(White, Cowpea)	(1.00)	(1.38)	(1.00)	(1.27)	(1.00)	(1.13)
T_2C3	0.00	0.67	3.00	0.00	1.00	0.93
(White, Green gram)	(1.00)	(1.27)	(1.95)	(1.00)	(1.38)	(1.32)
T_3C1	1.00	0.00	0.00	0.00	0.00	0.2
(Blue, Black gram)	(1.38)	(1.00)	(1.00)	(1.00)	(1.00)	(1.07)
T_3C2	0.00	2.00	0.67	2.00	2.00	1.33
(Blue, Cowpea)	(1.00)	(1.65)	(1.27)	(1.65)	(1.65)	(1.44)
T_3C3	0.00	0.00	0.67	0.00	0.00	0.13
(Blue, Green gram)	(1.00)	(1.00)	(1.24)	(1.00)	(1.00)	(1.04)
T_4C1	0.67	0.67	0.67	1.3	0.67	0.80
(Red, Black gram)	(1.27)	(1.24)	(1.27)	(1.52)	(1.24)	(1.30)
T_4C2	0.00	0.00	1.00	0.00	0.00	0.2
(Red, Cowpea)	(1.00)	(1.00)	(1.38)	(1.00)	(1.00)	(1.07)
T_4C3	0.00	0.00	2.67	1.33	1.00	1.00
(Red, Green gram)	(1.00)	(1.00)	(1.82)	(1.52)	(1.38)	(1.34)
T_5C1	2.00	6.00	0.33	2.67	2.67	2.73
(Yellow, Black gram)	(1.65)	(2.62)	(1.13)	(1.81)	(1.91)	(1.82)
T_5C2	0.00	4.67	6.00	3.67	3.67	3.60
(Yellow, Cowpea)	(1.00)	(2.20)	(2.67)	(2.02)	(2.15)	(2.00)
T_5C3	2.33	5.00	4.00	4.00	0.00	3.06
(Yellow, Green gram)	(1.72)	(2.42)	(2.22)	(2.07)	(1.00)	(1.88)
SEm+	0.16	0.23	0.23	0.25	0.15	
CD	NS	NS	0.71	NS	0.46	

Conclusion

Based on the current study on effect of different colour sticky traps against sucking pests of pulse crops, it can be concluded that white and yellow sticky traps are effective tools against aphid. Blue and white sticky traps can be used to manage the leafhopper and thrips population, respectively while yellow

sticky traps followed by green can be used to manage the whiteflies. White colour sticky trap can be used to monitor the presence of ladybird beetle in field.

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