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Effect of silver colour UV reflective polyethylene mulch on the incidence of thrips, *Thrips palmi* Karny (Thysanoptera: Thripidae) in watermelon

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Abstract
A field experiment was carried out to evaluate the effect of silver colour UV reflective polyethylene mulch on the incidence of thrips under farmer's field conditions during the month of February, 2014. The field was divided in to two blocks, each block was ten guntas. One block was covered with silver coloured UV reflective polyethylene mulch (30 µ or 120 guage) and another block was maintained without mulch. Results revealed that, significantly lesser level of thrips infestation (1.80 thrips/plant) and watermelon bud necrosis disease incidence (70.00 %) was observed in the case of watermelon block covered with silver colour UV reflective polyethylene mulch as compared to the block without the mulch (6.30 thrips/plant & 94.00 % disease incidence). Thus, it is clear from the present investigation that silver colour UV reflective polyethylene mulch works effectively in reducing thrips population in watermelon.

Keywords: UV reflective mulch, Watermelon budnecrosis virus, Tospovirus

1. Introduction

The main limiting factor in watermelon cultivation is occurrence of thrips, *Thrips palmi* Karny (Thysanoptera: Thripidae), as it acts as a vector for Watermelon Bud Necrosis Virus (WBNV) belonging to genus *Tospovirus*, the only plant infecting genus in the family Bunyaviridae [1, 2]. The thrips infesting watermelon, *T. Palmi* was first reported from Sumatra in 1925 [3]. Thereafter, *T. Palmi*has achieved a wide geographical distribution [4, 5]. Both nymphs and adult thrips lacerate the tissues and suck the oozed out sap. This feeding behaviour gives tissues a silver or bronze colour where damaged cells coalesce and can lead to stunting, distortion and scarring of plants and yield being significantly reduced [6].

Besides its direct damage, it can also transmit a number of plant TOSPO viruses including ground nut bud necrosis and watermelon silvery mottle virus [7]. Among the viral diseases, thrips transmitting WBNV has been cautioning us as an emerging pathogen causing significant yield reduction during last decade in the country. Presently, it is very severe on watermelon, resulting in huge yield losses ranging from 60 to 100 per cent depending upon the time of sowing and variety/hybrid [8, 9].

Presently, farmers are relaying only on insecticide applications to protect watermelon crops from *T. palmi.* Farmers take up as many as 2-3 foliar applications of various insecticides per week to control this pest. But, most labelled insecticides provide unsatisfactory control of this pest in the field [10]. Therefore, the present study was designed to examine the efficacy of silver colour UV reflective polyethylene mulch for thrips control and in turn its influence on WBNV disease incidence.

2. Materials and Methods

A field experiment was carried out under farmer's field conditions during summer season of 2014. The field was divided in to two blocks, each block was ten guntas. One block was covered with silver coloured UV reflective polyethylene mulch (30 µ or 120 guage) and another block was maintained without mulch. The seeds of water Watermelon (NS-295 hybrid) were sown by making holes of 10 cm diameter. The observations were made on thrips infestation by selecting thirty plants randomly from each block by tapping the growing tips of these plants on a stiff black paper board and fallen thrips were counted visually. Simultaneously, in each block, thirty plants were selected randomly for recording WBNV disease incidence.

The disease was diagnosed in the field based on symptoms exhibited on plants like leaf mottling, yellowing and necrotic spots on leaves, necrotic streaks on vein, petiole and stem, shortened internode, necrosis of the terminal bud. Of these plants, number of plants infected with WBNV was recorded. Then, the per cent disease incidence was calculated by using following formula.

$$\text{Per cent disease incidence} = \frac{\text{No. of plants infected}}{\text{Total no. of plants observed}} \times 100$$

2.1 Statistical Analysis
Data obtained from mulching study was analyzed by Student t- test.

3. Results and Discussion
The present study results revealed that, significantly lesser level of thrips infestation was observed in the case of watermelon block covered with silver colour UV reflective polyethylene mulch as compared to the block without the mulch. The mean number of thrips per plant recorded from the block with and without mulch was 1.80±0.19 and 6.30±0.86, respectively. Differences in the population were statistically significant from each other. Similar trend was also noticed with respect to WBNV disease incidence between watermelon block with and without mulch. The mean per cent WBNV disease incidence recorded in the block covered with mulch was 70.00±3.96 as against 94.00±0.85 in the case of block without mulch (Table 1).

Previous studies showed that plants grown on silver mulches show a reduced incidence of TSW compared to plants grown on black mulches [11]. This reduction has been attributed to an effect on the vector (thrips), due to a modification of the light environment around the plant [12].

The present study is similar with the statement that UV reflective metalized mulch was found most effective in reducing the incidence of TSWV on tomatoes. The regimen of metalized mulch along with insecticides reduced TSWV compared to control by as much as 70 percent. Thus metalized mulch technique was thought to be an effective tactic to reduce vector population and resulting infection. This tactic served to reduce both primary and secondary infection [13, 14]. Recent studies have shown that coloured plastic mulches can affect the light quality received by a crop, thus altering plant growth morphology and can affect populations of insect pests that vector viruses, especially aphids, thrips and whiteflies [15].

One of the study conducted in Japan, mulching ridges with black plastic reduced emergence of *T. palmi.* A plastic covering would have reduced the surface area of the soil available for pupation, although some larvae would probably have been able to emerge via gaps around the chrysanthemum stems. Both ingress (of larvae seeking pupation sites) and egress (of emerging adults) into/from the soil would however, be expected to decrease as a result of a plastic covering [16, 17].

In present study thrips population was reduced in mulched area as compare to non-mulched area, because host-seeking behavior of thrips can be disrupted by incorporating ultraviolet reflectance, thereby reducing thrips numbers on and around host plants [18-22]. The use of highly ultraviolet-reflective aluminized mulch as a bed covering provides this reflectance to disrupt initial flights of thrips into a field [18, 20, 21].

Table 1: Effect of Silver colour UV reflective polyethylene mulch on thrips infestation and WBNV disease incidence in watermelon

Treatments	*Mean No. of thrips /plant			Per cent WBNV disease incidence		
	30 DAS	45 DAS	Mean±SE	30 DAS	45 DAS	Mean±SE
With Mulch	0.23±0.09a	3.37±0.45a	1.80± 0.19a	42.00	98.00	70.00±3.96
Without Mulch	5.30±0.61b	7.27±0.61b	6.30 ± 0.86b	88.00	100.00	94.00±0.85
t-test (P=0.05)	2.05	2.00	2.05	-	-	-

* - Thrips population counted from 30 randomly selected plants

4. Conclusion
It can be concluded from the present investigation the use of silver colour UV reflective mulch found to be superior in reducing thrips population in watermelon there by reduces WBNV disease. Thus, this approach can be incorporated as one of the component in IPM programme.

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6. References
1. Singh SJ, Krishnareddy M. Watermelon bud necrosis: A new tospovirus disease. Acta Horticulture. 1996; 431:68-77.
2. Fauquet CM, Mayo MA, Maniloff J, Desselberger U, Ball LA. Virus Taxonomy. In: Eighth Report of the International Committee on Taxonomy of Viruses. Elsevier Academic Press, San Diego, CA, USA, 2005; 1259.
3. Karny HH. Die anTabak auf Java and Sumatra angetroffenen Blasenfusser (Thysanoptera). Bulletin of Deli Proefstation. 1925; 23: 3-55.
4. Lewis T. Flight and dispersal. In Thrips as crop pests. T. Lewis (ed.) CAB, Wallingford, Oxon, UK, 1997, 175-196.
5. Mound LA. Biological diversity. In: Thrips as crop pests. T. Lewis (ed.) CAB, Wallingford, Oxon, UK, 1997, 97-215.
6. Tsai JH, Yue B, Webb SE, Funderburk JE, Tsu HT. Effects of host plant and temperature on growth and reproduction of *Thrips palmi* (Thysanoptra: Thripidae). Environmental Entomology. 1995; 24:1598-1603.
7. Ullman DE, Sherwood JL, German TL. Thrips as vectors of plant pathogens. In: Thrips as crop pests. Lewis, T. (Ed.) CAB International, New York, 1997, 695.
8. Krishnareddy M, Singh SJ. Immunology and molecular based diagnosis of tospovirus infecting watermelon. Paper presented In: Golden Jubilee Symposium on Horticultural Research: Changing Scenario. Bangalore, India, 1993, 247.
9. Krupashankar MR. Studies on bud necrosis virus disease of watermelon (*Citrullus lanatus* Thunb.). M. Sc. (Ag.) Thesis, University of Agricultural Sciences, Bangalore (India), 1998, 76.
10. Seal DR. Management of melon thrips, *Thrips Palmi* Karny (Thysanoptera: Thripidae) using various chemicals. Proceedings of Florida State Horticulture Society. 2005; 118:119-124.

11. Schalk JM, Robbins ML. Reflective mulches influence plant survival, production, and insect control in fall tomatoes. Hort Science. 1987; 22:30-32.
12. Csizinszky AA, Schuster DJ, Kring JB. Evaluation of colormulches and oil sprays for yield and for the control of silverleaf whitefly, *Bemisia argentifolii* (Bellows and Perring) on tomatoes. Crop Protect. 1997; 16:475-481.
13. Momol MT, Funderburk JE, Olson S, Stavisky J. Management of TSWV on tomatoes with UV-reflective mulch and acibenzolar-S-methyl. Phytoparasitica. 1997; 25:111-116.
14. Krishnakumar NK, Venkatesh N, Kalleshwaraswamy CM, Ranganath HR. Seasonal incidence of thrips and bud necrosis virus on water melon. Pest Management in Horticultural Eco-Systems. 2006; 12:85-92.
15. Fortnum BA, Decoteau DR, Kasperbauer MJ, Bridges. Effect of colored mulches on root-knot of tomato. Phytopathology. 1995; 85:312-318.
16. Tsuchida K. Adult emerging site of *T. palmi* (Thysanoptera: Thripidae) in an eggplant field with mulching sheet. Applied Entomology Zoology. 1997; 32:246-249.
17. Cannon RJC, Matthews L, Collins DW, Agallou E, Bartlett PW, Walters KFA *et al*. Eradication of an invasive alien pest, *Thrips palmi*. Crop Protection. 2006; 26:1303-1314.
18. Brown SL, Brown JE. Effect of plastic mulch color and insecticide on thrips population and damage to tomato. Hort Technology. 1992; 2:208-210.
19. Kirk WDJ. Distribution, abundance and population dynamics, In: *Thrips as crop P*. T. Lewis (Ed.). CAB, International, Wallingford, UK, 1997, 217-257.
20. Kring JB, Schuster DJ. Management of insects on pepper and tomato with UV reflective mulches. Fla Entomology. 1992; 85:9-14.
21. Scott SJ, McLeod PJ, Montgomery FW, Handler CA. Influence of reflective mulch on incidence of thrips (Thysanoptera: Thripidae: Phlaeothripidae) in staked tomatoes. J Entomol Science. 1989; 24:422-427.
22. Stavisky J, Funderburk JE, Brodbeck BV, Olson SM, Andersen PC. Population dynamics of *Frankliniella* spp. and tomato spotted wilt incidence as influenced by cultural management in tomato. Journal of Economic Entomology. 2002; 95:1216-1221.