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Date palm white scale (*Parlatoria blanchardii* T): a new threat to date industry in Pakistan

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Abstract
Date Palm (*Phoenix dactylifera* L) is a key plantation crop of many countries. Despite of other serious pests of date palm *Parlatoria blanchardii* is a formidable pest of young date plantation. Experiment was carried out at Horticultural Research Institute to check the effectiveness of three systemic insecticides *viz.* thiamethoxam 25 WG, carbosulfan 25 EC and fipronil 80 WG and two IGR's *viz*. pyriproxyfen 10.8 EC and buprofezin 25 WP. Percent reduction in population was recorded 3, 7, 15 and 21 days of post application. Results reflected that all the chemicals significantly reduced the scale infestation (at 0.05 % level) but carbosulfan 25 EC showed maximum reduction in both application methods i.e. direct spray and basin application. However, direct spray method was more efficient than basin application method.

Keywords: Date Palm, *Parlatoria blanchardii*, Threat, Pakistan.

1. Introduction
Date palm (*Phoenix dactylifera* L.) is the most ancient tree cultivated since 4000 B.C. Pakistan is the 6th largest producer of the dates after Egypt, Saudi Arabia, Iran, Algeria and Iraq with a production of 557279 tons per year [9]. Key dates producing provinces are Sindh (Sukkur and Khairpur), Balochistan (Panjgoor and Makran), Khyber Pakhtunkhwa (D. I. Khan) and Punjab (Jhang, Muzafargarh, D. G. Khan and Bahawalpur) [11]. Date palm is attacked by a number of insect pests such as red palm weevil, lesser date moth, termites, date scales, mealy bugs and mites. Among these, white date palm scale *Parlatoria blanchardii* (Targ.) is one of the most destructive pests. Female lays its eggs under the shield. Adults and nymphs of this insect feed on leaves sap [7]. High level of infestation causes significant damage, resulting in early dropping of leaves and yield reduction. In addition *Parlatoria blanchardii* (Targ.) secretes toxic saliva that causes malformed leaf and shoot growth, low photosynthesis and respiration rate, which leads to curling, yellowing and dropping of leaves, dwarfing of plant, decreasing or destroying chlorophyll. *P. blanchardii* affects photosynthetic pigments (chlorophyll-a, chlorophyll-b and carotenoids), leaflet area, moisture percentage, dry weight and wax contents [12].

This subsequent damage leads to considerable quality and quantity yield losses and also marketing value of the fruits [5, 7, 8]. It reduces the production 30-50 kg per palm [10]. Some times it reaches to 85-90 % losses depending on, varietal tolerance, severity of infestation and orchard management [1]. The present study thus aims to curb the population density of *P. blanchardii* on date palm by using insecticides (systemic and insect growth regulators) which are easily available commercially in term of direct spray and basin applications.

2. Material and Methods
The experiment was carried out under RCBD in the experimental area of Horticultural Research Institute, Ayub Agriculture Research Institute, Faisalabad during 2012-14. Five insecticides i.e. thiamethoxam 25 WG, buprofezin 25 WP, pyriproxyfen 10.8 EC, carbosulfan 25 EC and fipronil 80 WG including a control treatment were used. The dose rate of thiamethoxam 25 WG (20 gm), buprofezin 25 WP (250 gm), pyriproxyfen 10.8 EC (100 ml), carbosulfan 25 EC (250 ml) and fipronil 80 WG (100 gm)/100 liter water was used. Pretreatment data regarding the date palm scales were recorded on the basis of 10 leaves / plant. The population of *P. blanchardii* was recorded from the area of 1 cm^2 upper, 1 cm^2.

middle and 1 cm^2 lower part of a leave. Due to very high density of population on the leaves, it was not possible to calculate from the whole leave. That's why population was calculated from the area of 1 cm^2. Insecticides were applied by using two different methods of application i.e. direct spray application and basin application. Hand knapsack sprayer was used to apply chemicals in spray method and a solution of 10 liter volume of each chemical was applied at the base of palm tree in basin application method. Plants of 2 to 4 years of age were selected for insecticides application under different methods because young plants are most susceptible for scale attack. Each insecticide was applied thrice. Percent reduction in population was recorded 3, 7, 15 and 21 days after insecticides application under the binocular microscope and the data were recorded for percentage reduction of the adult female and immature stages. Data were analysed by using statistical software Statistix 8.1, where level of significance, comparison of means and error means was calculated.

Percent reduction for each interval = $T_X = P_R - P_S / P_R \times 100$

Where;
T_X= Insecticides, P_R= Pretreatment Population, P_S= Post treatment Population

3. Results and Discussion

The results of present investigation have been presented in Figures 1-3 and Table 1. Pretreatment population was recorded before insecticides application. Fig. 1 shows the population in both methods.

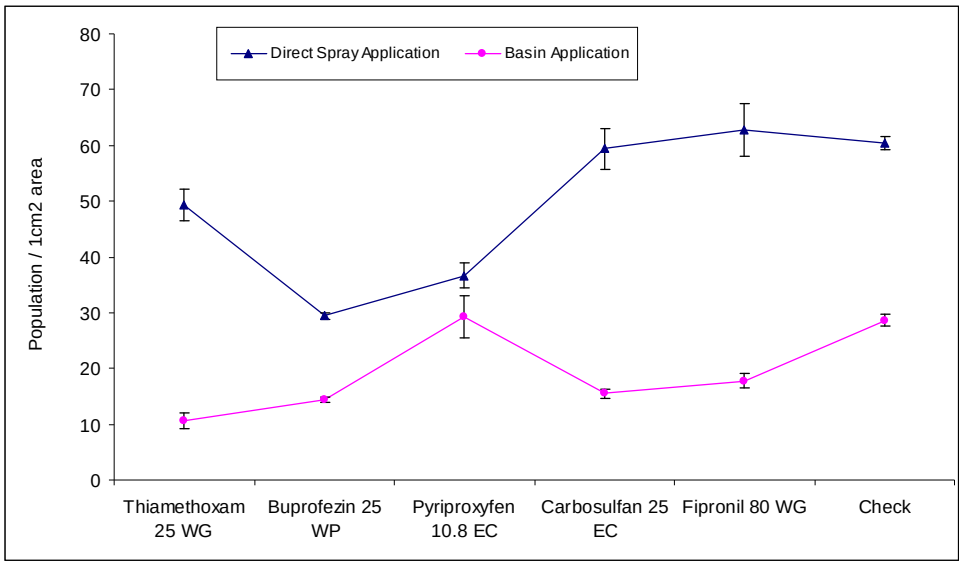

Fig 1: Comparison of pre-treatment population in two methods

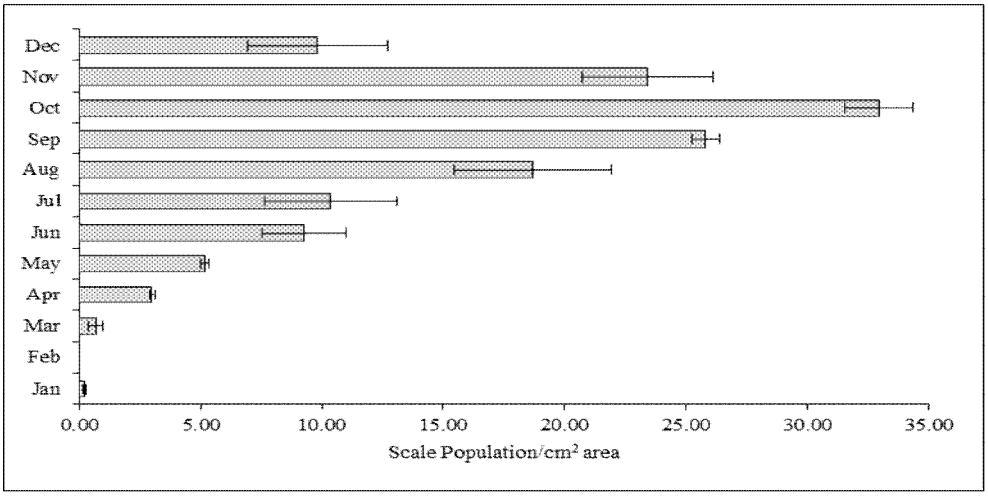

Fig 2: Population intensity of scale in different months

In direct spray method the population of white scales was higher as compared to the basin application method. Maximum average population was recorded as 62.84 scales/cm^2 in direct spray method and 29.34 scales/cm^2 in basin method. Minimum average population was recorded as 29.39 and 10.69 scales/cm^2 in direct spray and basin method, respectively. Population of date palm scale was monitored throughout the year where maximum population was observed in the summer months. Population appeared in March and gradually increased, showed its peak in August-September as shown in figure 2. Table 1 shows the range of scale population in two methods. Maximum range was computed to be 55.24-70.25

and 23.25-36.51 scales/cm^2 in direct spray and basin application methods, respectively. Minimum range was computed to be 28.21-30.45 and 7.650-12.25 scales/cm^2 in direct spray and basin application methods, respectively. Maximum range was computed from direct spray plant while minimum was recorded from basin method. This range is very high as compared with Al-Dosary (2009) [3] who reported that highest percent and severity of infection of white scale in 2007 was 23.25 % and 3.61 insects/cm^2, the same in 2006 was 21.21 % and 2.82 insects/cm^2.

Same insecticides i.e. thiamethoxam 25 WG, buprofezin 25 WP, Pyriproxyfen 10.8 EC, carbosulfan 25 EC and fipronil 80 WG were used in spray as well as basin application method.

Fig. 3 shows the percent reduction in scale population under different intervals. After 3 days of insecticides application no significant reduction in scale population was recorded. However, carbosulfan 25 EC showed 14.04% reduction in scale population followed by buprofezin 25 WP (11.39%), thiamethoxam 25 WG (8.28%), fipronil 80 WG (7.60%) and pyriproxyfen 10.8 EC (5.77%). After 7 and 15 days of interval scale population decreased significantly. After 21 days of application thiamethoxam 25 WG showed maximum reduction of 61.25% followed by buprofezin 25 WP, pyriproxyfen 10.8 EC, carbosulfan 25 EC and fipronil 80 WG (with 73.27, 68.48, 79.41 and 69.64% reduction, respectively). Carbosulfan 25 EC was most effective (79.41%) followed by buprofezin 25 WP (73.27%).

Table 1: Range of Pre-population of scales/cm^2 in two methods

Sr. No.	Treatments	Range (Direct Spray)	Range (Basin Application)
1	Thiamethoxam 25 WG	45.45-54.87	7.650-12.25
2	Buprofezin 25 WP	28.21-30.45	13.84-15.25
3	Pyriproxyfen 10.8 EC	32.56-40.25	23.25-36.51
4	Carbosulfan 25 EC	53.24-65.58	14.28-17.29
5	Fipronil 80 WG	55.24-70.25	16.27-20.10
6	Check	59.34-63.21	26.69-30.03

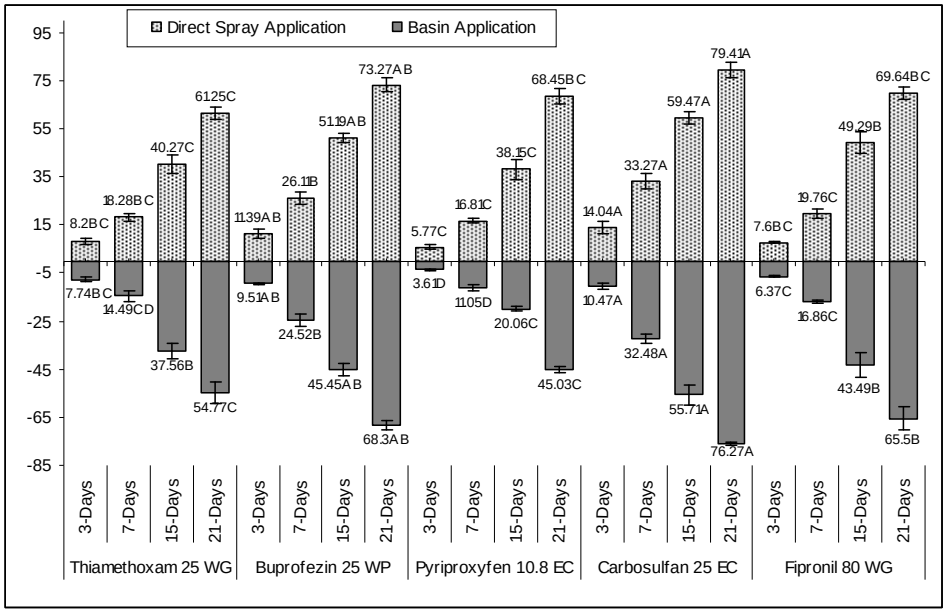

Fig 3: Percent reduction in white scale population in two methods

After 3 and 7 days of application in the basin application method, no significant reduction in scale population was recorded. But Carbosulfan 25 EC showed maximum reduction 10.47 and 32.48% after 3 and 7 DAT, respectively. Reduction in scale population was found to increase after 15 and 21 days. Carbosulfan 25 EC was most effective (76.27%) followed by buprofezin 25 WP (68.3%) and fipronil 80 WG (65.5%). Pyriproxyfen 10.8 EC and thiamethoxam 25 WG showed less effectiveness (45.03 and 54.77%, respectively).

All the chemicals performed well in spray method as compared to the basin application method. However, this experiment includes three systemic and two IGR insecticides and systemic insecticides were found to provide better control. Carbosulfan 25 EC and buprofezin 25 WP performed well in the both application methods but most effective in spray application method. These results are quite similar with Palmer and E. Vea (2013) [13] who confirmed the efficacy of buprofezin on Euonymus Scale on Wintercreeper and Tea Scale on Japanese Camellia (*Camellia japonica*) in which Talus 40 SC (buprofezin) showed 49.6 and 76.5% mortality after 14 and 28 days, respectively on Euonymus scale and 85 % mortality on Tea scale by foliar application. He also confirmed the efficacy of Distance 10 EC (pyriproxyfen) and Talus 70 DF (buprofezin) on Southern Magnolia against False Oleander scale where Distance 10 EC and Talus 70 DF showed 32.3 and 50.2% reduction (2 weeks interval). These findings are in agreement with our results where pyriproxyfen 10.8 EC and buprofezin 25 WP were 38.15 and 51.19% effective, 15 days after foliar application. Pyriproxyfen 10.8 EC was more effective as foliar/sprays (68.45%) as compared to the basin (45.03%) application method. These findings are supported by Raupp *et al*. (2008) [14] who conducted an experiment on efficacy of foliar applications, trunk injections, and soil drenches of IGR (pyriproxyfen) and horticultural oil in reducing population of Elongate Hemlock Scale (*Abgrallaspis ithacae)*. Results indicated that foliar application

of pyriproxyfen and horticultural oil provided superior levels of control of Elongate Hemlock Scale as compared with soil drenches and trunk injections. Pyriproxyfen 10.8 EC and thiamethoxam 25 WG gave minimum reduction 45.03, 68.45 % and 54.77, 61.25% in basin and spray method, respectively after 3 weeks of treatments application. Ahmed (2005) [2] recommended the application of synthetic pesticides against scales among which Actara (thiamethoxam) 25WG was considered of relative safety and efficient. These findings are not in agreement with Taha *et al*. (2012) [15] who checked the effects of the powder of argel (*Solenostemma argel*) and usher (*Calotropis procera*) females of green pit scales (*Asterolicanium phoenicis* Rao.) in soil dressing method in which Actara (thiamethoxam) 25 WG (standard insecticide) showed 65.7% reduction after 4 weeks. Whereas Raeda *et al*. (2009) [4] used Actara, Dursban and Patron to control fig wax scale (*Ceroplastes rusci* L.). He concluded that all the chemicals gave significant control but Actara (thiamethoxam) showed maximum mortality (86.3 ± 5.3) 3 weeks after application.

It is thus concluded that systemic insecticides or insect growth regulators will be the best option to control date palm white scale. Direct spraying of insecticides will yield better results than basin application method.

4. Reference

1. Ahmed MA. The efficacy of Confidor 200 SL against the green date palm pit scale insect (*Asterolicanium phoenicis* Rao) (Homoptera: Asterolicaniidae). Proceedings of 2nd national pest management conference. Faculty of Agric Sci Univ. of Gezira, Sudan, 2004.
2. Ahmed MA. Recommendation of four systemic insecticides for control of the green date palm pit scale insect (*Asterolicanium phoenicis* Rao) (Homoptera: Asterolicaniidae) using two methods of application. Proceedings of 72nd meeting of the pest and diseases committee, Wad Medani, Sudan 2005, 24.
3. Al-Dosary HN. Effect of leaf pinaes chemical composition of different date palm cultivar on infection by whit scale insect *Parlatoria blanchardii* (Targ.). Magazin of Al-Kufa Univ for Biol 2009; 1(2):171-181.
4. Raeda AA, Bilal HM, Al-Antary TM. Evaluation of the efficacy of conventional and non-conventional insecticides on Fig Wax Scale *Ceroplastes rusci* L. (Homoptera: Coccidae) and its parasitoid, *Scutellista Cyanea* M. (Hymenoptera: Pteromalidae). Jordan J Agric Sci 2009; 5(2):178-190.
5. Blumberg D. Date palm arthropod pests and their management in Israel. Phytoparasitica 2008; 36(5):411-448.
6. Eldoush KOAM, Taha AK, Elsir T, Idris IM, Sidahmed OAA, Eldeen F *et al.* Application of plant based extracts for the control the green pit scale insect (*Asterolicanium phoenicis* Rao.) with yield enhancement on date palm. J Food Agric 2010; 23(5):404-412.
7. El-Said MI. Survey of date palm insects in North Sinai with special reference to the ecology and biology of the species, *Parlatoria blanchardii* (Targ.-Tozz), supper family Coccoidea. M.Sc. Thesis, Fac. of Agric., Cairo Univ, 2000, 97.
8. El-Sherif SI, Elwan EA, Abd-El-Razik MIE. Ecological observations on the date palm parlatoria scale, *Parlatoria blanchardii* (Targ. - Tozz.) (Homoptera: Diaspididae). 2nd Inter. Conf. on Date Palms, Egypt, 2001, 25-27.
9. FAO. Food and Agriculture Organization. Available online with updates at http://faostat.fao.org/site /567/default.aspx#ancor, 2011.
10. Idris TIM, Ibrahim AH, Taha AK. A study of the current status of date palms in the Nothern State. Technical report, Agric. Res. Corp. and the Univ. of Dongola, Sudan, 2006, 85.
11. Markhand GS, Abul-Soad AA, Mirbahar AA, Kanhar NA. Fruit characterization of Pakistani dates. Pak J Bot 2010; 42:3715-3722.
12. Moussa SFM, Salman AMA, Bakry MMS. The negative effects of *Parlatoria blanchardii* (Targ.) infestation on the morphological and chemical characters of certain varieties leaflets of date palm trees at Luxor governorate, Egypt. Acad J Biol Sci 2012; 5(1):169- 181.
13. Palmer C, Vea E. IR-4 Ornamental Horticulture Program, scale and mealybug efficacy, 2013, 11-45. http://ir4.rutgers.edu/Ornamental/SummaryReports/ScaleMealyBugDataSummary, 2013.
14. Raupp M, Ahern R, Onken B, Reardon R, Bealmear S, Doccola J *et al.* Efficacy of foliar applications, trunk injections, and soil drenches in reducing populations of Elongate Hemlock Scale on eastern hemlock. Arboriculture & Urban Forestry 2008; 34(5):325–329.
15. Taha AK, Khalid OAME, Tagelsir IM, Idris Sidahmed OAA. Argel (*Solennostemma argel*) applications for control of the date palm green pit scale insect (*Asterolicanium phoenicis* rao) and yield enhancement. J Agric and Biol Sci 2012; 7(6):380-385.