J. Plant Prot. and Path., Mansoura Univ., Vol. ٢ *(*٤*):* ٣٣٢ - ٣٤٠, ٢٠١٠

EFFECT OF SOME POWDERS AND HIVE PRODUCTS ON LARVAL HAEMOLYMPH OF SILKWORM

Abdel-Rahman,Y.A.[١];M.H.Hussein[٢]; S. H. Rateb[٢] and R.E. Hassan[١]
١- Plant Prot. Dept., Fac. of Agric., Al-Azhar Univ., Assiut.
٢- Plant Prot. Dept., Fac. of Agric., Assiut University.

ABSTRACT

Two doses (٥ and ١٠ gms) of ١٤ powders (hive products and plant materials) were added to mulberry leaves, and two levels (%) of ١٤ liquid treatments (hive products, honey, pollen, royal jelly and propolis and their mixtures) were sprayed on mulberry leaves which feed to ٤th and ٥th instar larvae of silkworm. Effects on haematological characters, Total Soluble Solids % (T.S.S.%), Total Haemocyte Counts/mm٣ haemolymph (T.H.C.), and Differential Haemocytes Counts % (D.H.C.%), were studied in ٥th instar larval haemolymph. The best tested powders (gm), and liquids (%), with respect to (T.S.S.%) can be arranged desindinglly as follow: Palm Pollen, hand-collected (١٠ gm), Pollen from honey bee colonies (١٠ gm). Drone brood, dried (٥ gm), Soya flour, defatted (١٠ gm), Pollen (٠,٣٪), Pollen (٥ gm), Royal Jelly (٠,٠٣٪), and Honey (١٪). This depends on % increment of these treatments over control. Concerning (T.H.C.), the best treatments were: Palm Pollen (١٠ or ٥ gms), Pollen (١٠ gm), Royal Jelly (٠,٠٢٪), Pollen (٠,٢٪), Pollen + Propolis (٠,٢٪ + ٠,١٪), and Drone Brood (٥ or ١٠ gms). Powder treatment was more effective as compared with liquid treatment, with respect to T.S.S.% and T.H.C. Prohaemocytes %, was higher in Pollen (٠,٢ & ٠,٣٪) and its mixture with Royal Jelly (٠,٢٪ + ٠,٠٢٪), Plasmatocytes %, Granular cells %, and Oenocytoides %, were in Pollen + Honey (٠,٢٪ + ٢٪); Pollen + Propolis (٠,٢٪ + ٠,١٪) and Honey + Royal Jelly (٢٪ + ٠,٠٢٪), treatments, respectively, while Spindle cells % were more in control, as compared with all tested liquid treatments. In powder treatments (gm), maximum % abundance of prohaemocytes was in Pollen (٥ & ١٠ gms), Soya (٥ & ١٠ gm), Palm Pollen (٥ & ١٠ gms) and Drone Brood (١٠ gms). Maximum % abundance of other haemocytes types, was noticed with powders from Vasaka, Buddleia, and Spearmint leaves. Statistical analysis of obtained data revealed highly significant differences between treatments and used doses, and these data were discussed.

INTRODUCTION

Insect haemolymph contains haemocytes suspended in plasma. Haemocytes have essential roles in numerous physiological activities (Wigglesworth, ١٩٥٩). This fluid reflects physiological or pathological condition of the insect (Kostecki, ١٩٦٥).

Effects of different factors or treatments on the larval haemolymph of silkworms were studied by many researchers: Radwan, ١٩٧٨; El-Deeb, ١٩٨١; Horrie and Watanbe, ١٩٨٣; Salem *et al*., ١٩٨٥a,b; Abd El-Naby, ١٩٨٨; Reddy *et al*., ١٩٩١; Thyagaraja *et al*., ١٩٩١; Ashour, ١٩٩٧; Eid *et al*., ١٩٩٩; Abdellah, ٢٠٠٧; Rateb *et al*., ٢٠١٠; Kumar and Michael, ٢٠١١ and Manjula *et al*., ٢٠١١.

This work aims to study the effects of ١٤ powders and hive products with mulberry leaves on total soluble solids (%), total counts of haemocytes/mm٣ in ٥th (T.H.C.) and (D.H.C.%) instar larval haemolymph of local silkworm.

MATERIALS AND METHODS

Fourteen powder treatments were used with mulberry leaves in feeding of ٤th and ٥th instars of silkworm. They were: pollen (from pollen trap soya flour (defated), dried drone brood, palm pollen (hand-collected), ascorbic acid, lantana, eucalyptus, basil, spearmint, thyme, ziziphus, buddleia, Vasaka, and guava. Two levels, ٥ and ١٠ gm, were used for each treatment.

Fourteen hive products liquid treatments were used with mulberry leaves for feeding of ٤th and ٥th instars of silkworm. They were: bee honey (١ and ٢ gms); royal jelly (٠,٠٢ and ٠,٠٣ gm); propolis (٠,١ and ٠,٢ gm); pollen (٠,٢ and ٠,٣ gm); pollen + royal jelly (٠,٢ + ٠,٠٢ gm); pollen + honey (٠,٢ + ٢ gm); pollen + propolis (٠,٢ + ٠,١ gm); honey + propolis (٢ + ٠,١ gm); honey + royal jelly (٢+٠,٠٢ gm); and propolis + royal jelly (٠,١+٠,٠٢ gm). Two concentrations were used for each treatment.

Every tested powder or liquid was replicated three times in three carton boxes, each contain ٥٠ larvae. Feeding with treated leaves was conducted four times/day. Control larvae were fed with untreated mulberry leaves was used with ١٠٠ ml distilled water.

A simple method adopted by (Hussein, ١٩٧٨) using hand refractometer was used for determination of total soluble solids (%) in ٥ day-old of ٥th instar larval haemolymph. Total counts of haemocytes in larval haemolymph was conducted as described by (Predtetshensky *et al*., ١٩٥٠) and (D.H.C.%) as described by (Jones, ١٩٦٧).

Means of tested haematological characters, and % over control readings, were calculated. Statistical analysis was carried out to compare the obtained means of studied parameters.

RESULTS AND DISCUSSION

Data of the effect of powder treatments on Total Soluble Solids % (T.S.S.%), Total Haemocytes Counts/mm^3 haemolymph (T.H.C./mm^3), and Differential Haemocytes Counts %, or types of haemocytes (D.H.C.%) and % over control of these data, in ٥th instar larval haemolymph of silkworm are summarized in Table (١).

Maximum (T.S.S.%) in larval haemolymph, and (% over control), in five grams-powder treatments was ١٣,٨٦٪, or (٣١,٢٥٪); ١٣,٧٤٪, or (٣٠,١١٣٪); and ١٢,٩٪ or (٢٢,١٥٩٪), in palm pollen, soya flour, and pollen, respectively. While, in ١٠ grams-powder treatments, maximum mean (T.S.S.%) was ١٤,٣٧٪ or (٤٢,٨٤٢٪); ١٣,٧٨٪, or (٣٦,٩٧٨٪); ١٣,٣٪, or (٣٢,٢٠٦٪); and ١٣,٢٩٪, or (٣٢,١٠٧٪), in palm pollen, pollen, drones brood, and soya, respectively.

Higher figures of T.S.S.% in haemolympy, which reflects more active physiological condition was noticed in ١٠ grams-powder treatments, followed by ٥ grams-treatments, with palm pollen, soya, pollen and drones brood. The effect of soya on increasing (T.S.S.%) in silkworm, was also noticed by Rateb *et al*. (٢٠١٠), and by Manjula *et al*. (٢٠١١), with, other legume plant cowpea.

١

(T.S.S.%) in larval haemolymph was less than control in the following treatments: basil (١٠ gm), spearmint (٥ and ١٠ gms), Buddleio (٥ and ١٠ gms), and vaska (٥ gm). The same was noticed in (T.H.C.), with basil, spearmint and buddleia. During this work (T.S.S.%) was ranged from ٩,٠٢٪ to ١٤,٣٧, while it ranged from ٩,٣٣٥٪ to ١١,٢٩٥٪ as reported by Ahmed (١٩٩٩), and ٧,٦٤٠٪ to ١٠,٠٧٣٪ as reported by Abdellah (٢٠٠٧) and ٩,١٠٧ to ١٠,٥٩٤٪ as reported by Rateb *et al*. (٢٠١٠).

Maximum (T.H.C./mm^{٣} haemolymph) and (% over control) was ٢٥٩ blood cells, or (١١٩,٣٩٪), and ٢٧٣٦ cells, or (١٤٩,١٨٪), in ٥ gms, and ١٠-grams palm pollen treatments, respectively, followed by treatments of pollen, soya, and drone brood, in two tested levels. The same was observed in respect to T.S.S.%.

More positive effect on (T.S.S%) and (T.H.C.), as a result of using plant powders was noticed in case of eucalyptus they are, and guava treatments, as compared with other plant powders, such as lantana, ziziphus, basil, spearmint, buddleia and Vasaka.

(T.H.C./mm^{٣} haemolymph) was less than control figures in the following treatments basil (٥ & ١٠ gms), spearmint (٥ & ١٠ gms) and buddleia (١٠ gm). This reflects disturbance in physiological condition of silkworm. The same was noticed by Kumar and Michael (٢٠١١). They noticed that (T.H.C.) were decreased by ١٥٪ after infection of silkworm by flacherie.

Highly significant increment % in T.S.S. % was detected in pollen palm pollen, ascorbic acid and drone brood treatments, at ٥ gm level, as compared with control.

T.H.C./mm^{٣} haemolymph increase in the aforementioned treatments, in addition to eucalyptus and guava treatments, as compared with control, at ٥ and ١٠ gms levels. No significant differences in (T.H.C.) were observed between tested doses in all used powder treatments.

Concerning (D.H.C.%), maximum prohaemocytes %, or ٨٣,١٪ and ٨٤,٥٪, counts was detected in pollen (٥ and ١٠ gms) treatment, respectively. It is well known that prohaemocytes formation leads to production of all other types of haemocytes. Prohaemocytes were increased also in soya (٥ and ١٠ gms), palm pollen (٥ and ١٠ gms), and drone brood (١٠ gms), treatments, while it was lower than control, which reflects less activation of physiological condition, in the following treatments: Lantana (٥ gm), basil (٥ and ١٠ gms), spearmint (٥ and ١٠ gms), thyme (٥ gm), buddleia (٥ gm) and Vasaka (٥ and ١٠ gms).

Maximum increment of plasmatocytes % was in basil (٥ gm) and spearmint (١٠ gms) treatments. Maximum increase of spindle cells was noticed in Vasaka (٥ gm), and buddleia (١٠ gms) treatments. Highest % abundance of granular cells was noticed in control of ٥ gms dose treatments, and in vasaka (١٠ gms) treatment. Maximum percentage of oenocytoides, the largest blood cells types, was found in spearmint (١٠ gms) treatment.

It is of interest to note that increment of prohaemocytes in pollen (hive product), soya, palm pollen and drone brood (hive product) treatments leads to less abundance % of other four types of haemocytes.

Highly significant differences in prohaemocytes and granular cells were detected between all used treatments and concentrations.

Highly significant differences were detected between treatments with plasmatocytes, spindle cells and oenocytoides. Highly significant differences in prohaemocytes %, in palm pollen, soya and pollen treatments, at ٥ gm and ١٠ gms level, and control. Significant differences between abundance of other types of haemocytes and control, were detected. Highly significant increase % of oenocytoids %, over control, were detected in treatments of buddleia, spearmint, basil and drone brood.

Data in Table ٢ show the effect of hive products (honey, royal jelly, propolis, pollen and their mixture) on haematological characters (T.S.S.%, T.H.C. and D.H.C.%) of ٥^{th} larval instar of silkworm.

Maximum (T.S.S.%) and (% over control) was ١٣,٠٨٪, or (٣٠,٠١٩٪), ١٢,٢٧٪ or (٢١,٩٩٨٪); and ١١,٦٦٪, or (١٥,٩٠٤٪), in pollen (٠,٣ gm), royal jelly (٠,٠٣ gm) and honey (١ gm), respectively, followed by pollen (٠,٢ gm), and its mixture with royal jelly (٠,٢ + ٠,٠٢ gm). Reading of T.S.S.%, were less than control in the following treatments: honey (٢ gm), propolis (٠,٢ gm) and their mixture (٢ + ٠,١ gm).

Highly significant differences in (T.S.S.%) were noticed between control and all liquid treatments, except in honey (٢ gm) and its mixture with royal jelly or propolis treatments.

Concerning total haemocytes counts/$mm^{٣}$ haemolymph (T.H.C.), maximum numbers of haemocytes and (% over control) were: ٢٣٥٣ cell, or (٩٩,٢٣٧٪); ٢٣٤٥ cell, or (٩٨,٥٦٪); and ٢٣٣٣ cell, or (٩٧,٥٤٤٪), in royal jelly (٠,٠٢ gm); pollen (٠,٢ gm) and pollen + propolis (٠,٢ + ٠,١ gm) treatments, respectively.

(T.H.C.), were less than control in the following treatments: propolis (٠,٢ gm), honey (٢ gm), and its mixture with pollen (٠,٢ gm), or propolis (٠,١ gm), or royal jelly (٠,٠٢ gm).

Thus, depends on data of the effect of honey (٢ gm, or ٢٪) concerning (T.S.S.%) and (T.H.C.), and its mixture with pollen (٠,٢٪), propolis (٠,١٪), and royal jelly (٠,٠٢٪), this dose of honey (٢٪), and its mixtures with other hive products, not recommended for using as additives to mulberry leaves for feeding of silkworm. This from the haematological point of view.

Highly significant increment in (T.H.C.), over control, in the following treatments: honey (١ and ١ gms), royal jelly (٠,٠٣ gm), pollen (٠,٢ gm), and propolis (٠,١ gm). Significant decrease in (T.H.C.) was detected in royal jelly (٠,٠٢ gm), pollen + propolis, royal jelly plus pollen or propolis, as compared with control.

Maximum abundance % of prohaemocytes was noticed in pollen (٠,٢٪ and ٠,٣٪), and its mixture with royal jelly (٠,٢٪ and ٠,٠٢٪) treatments, and their % abundance in all tested treatments were more than control. Maximum % abundance of plasmatocytes, granula cells and oenocytoides, were in treatments of: pollen + honey (٠,٢٪ + ٢٪); pollen + propolis (٠,٢٪ + ٠,١٪); and honey + royal jelly (٢٪ + ٠,٠٢٪), respectively, while spindle cells % were more in control, as compared with tested treatments.

Kumar and Michael (٢٠١١) reported that prohaemocytes and granular cells, which for the bulk of haemocytes, were not influenced by *Bacillus thuringensis*, while plasmatocytes were significantly increased.

Highly significant increase % in prohaemocytes was noticed in pollen (٢٪) treatment. Highly significant increment % in plasmatocytes in all treatments, except, pollen + honey, royal jelly + honey and propolis (٠,١٪), as compared with control. Highly significant increase %, as compared with control, was noticed in spindle cells, in all treatments, except: propolis (٠,٢٪), and its mixture with pollen or honey. Granula cells were increased significantly in propolis (٠,٢٪), honey (٢٪), and propolis + pollen treatments, as compared with control. Oenocytoids %, were significantly decreased, as compared with control, in propolis (٠,٢٪), pollen (٠,٣٪), pollen plus honey or propolis treatments.

From obtained data in Table ١ and ٢, and with respect to (T.S.S.%) in silkworm larval haemolymph, and depending of % increase over control readings, the tested powders (gm) and liquids (%) can be arranged desindinglly as follow: palm pollen (١٠ gm), pollen (١٠ gm), drone brood (٥ gm), soya (١٠ gm), palm pollen (٥ gm), soya (٥ gm), pollen (٠,٣٪), pollen (٥ gm), royal jelly (٠,٠٣٪), and honey (١٪).

Thus, it can be concluded that using of powders for fortification, or as additives, to mulberry leaves is better than using of liquids, with respect to (T.S.S.%), an indicator of insect physiological condition, in larvae of silkworm. The same conclusion was obtained by Rateb *et al*. (٢٠١٠).

From Table ١ and ٢, % over control, of T.H.C./mm^{٣}, can be arranged desindinglly as follow: palm pollen (١٠ or ٥ gms), pollen (١٠ gm), royal jelly (٠,٠٢٪), pollen (٠,٢٪); pollen + propolis (٠,٢٪ + ٠,١٪), and drone brood (٥ or ١٠ gms).

It can be concluded, as with (T.S.S.%), that concerning (T.H.C.), using of powders is better than liquids as additives to mulberry leaves. The same was observed by Abdellah (٢٠٠٧) and Rashwan (٢٠١٠).

REFERENCES

Abdellah, E.E. (٢٠٠٧): Studies on some factors affecting growth and productivity of mulberry silkworms (*Bombyx mori* L.). M.Sc. Thesis, Assiut Univ., ١٣٨ pp.

Abd El-Nabi, S.M.M. (١٩٨٨): Activation of silk secretion in silkworms *Philosamia ricini* and *Bombyx mori* after applying antibiotics. Ph.D., Cairo Univ., ١٢٤ pp.

Ahmed, A.M. (١٩٩٩): Improving the silkworm productivity in Assiut area. Msc. Thesis. Assiut Univ., ٩٦ pp.

Ashour, A.T. (١٩٩٧): Effect of feeding and hormonal treatments on some biological and physiological parameters of silkworms *Bombyx mori* and *Philosamia ricini*. Ph.D., Cairo Univ., ١١٠ pp.

Eid, M.A.A., Souad M. Mahmoud and S.A.S. El-Maasarawy (١٩٩٩): Effect of antibiotics on the haemocytes of the silkworms *Philosamia ricini* and *Bombyx mori* L. XVIIIth ISC Congress ١٢-١٦ October ١٩٩٩, ٤٠٣.

El-Deeb, A.S. (١٩٨١): Biological and physiological studies on *Philosamia ricini* Boisd. M.Sc. Thesis, Faculty of Science, Alexandria University.

Horie, Y. and K. Watanabe (١٩٨٣): Effect of various kinds of dietary protein and supplementation with limiting amino acids on growth, haemolymph components and uric acid excretion in the silkworm, *Bombyx mori*. J. Insect Physiol. Vol. ٢٩ (٢): ١٥٧-١٩٨.

Hussein, M.H. (١٩٧٨): Haematological studies on some lepidopterous larvae. ٤th Conf. Pest Control, NC. ٣٥٧-٣٦٥.

Jones, J.C. (١٩٦٧): Normal differential counts of haemocytes in relation to ecodysis and feeding in *Rhodnius*. J. Insect Physiology, ١٣: ١١٣٣-١١٤١.

Kostecki, R. (١٩٦٥): Investigation on the haemocytes and haemolymph of honey bees. J. Apicult. Res. ٤ (١): ٤٩-٥٤.

Kumar, M.D. and A. Michael (٢٠١١): Effect of Serifeed, a food supplement enriched feed of silkworm on its nutritional and economic parameters. Int. J. Sci. & Engin. Res. ٢: ٩.

Manjula, S.; S. Selvi, S. Nadanam; and N. Saravanan (٢٠١١): Modifications in the haemolymph of silkworm fed with mulberry leaves augmented with cowpeas. Anamalia Nagar, ٦٠٨, (١): ٦٤-٦٨.

Predtetshensky, V.E., V.M. Parovska and L.T. Margolina (١٩٥٠): Goso Uzd. Medgez. Moskva (In Russian).

Radwan, M.A.S. (١٩٧٨): The effect of castor plant fertilizers on the biochemical and properties of silk of the eri-worm. M.Sc. Cairo Univ., ١٠٣ pp.

Rateb; S.H.; M.H. Hussein; M.O. Mohamed and Heba R. Abdel-Karim (٢٠١٠): Effect of some additives to mulberry leaves on larval haemolymph of silkworm (*Bombyx mori* L.). J. of Plant Protection and Pathology, Vol. ١ (٣): ١٣٣-١٣٩.

Reddy, K.V.R.; O.R.R. Deri and K.V. Benchamin (١٩٩١): Impact of uzi fly parasitisation on the body growth, silk gland tissue somatic index and haemolymph properties of silkworm. Indian J. Seric., ٣٠ (٢): ١١٣-١٢٠.

Salem, M.A., M.A. Eid and S.A.S. El-Maasarawy (١٩٨٥a): Blood pattern in the Eri-silkworm, *Philosamia ricini* Boisd. under varied conditions (Lepidoptea, Saturniidae). Proc. ١st Conf. Pl. Prot. Res. Ins. Vol. II: ١٧٣-١٩١.

Salem, M.S., M.A. Eid and S.A.S. El-Maasarawy (١٩٨٥b): Quantitative analyses of blood pattern in the Eri-silkworm, *Philosamia ricini* Boisd., under varied conditions (Lepidoptea: Saturniidae). Proc. ١st Conf. Pl. Prot. Res. Ins. Vol. II: ١٩٣-٢٠٩.

Thyagaraja, B.S., T.J. Kelly, E.P. Maslev and A.B. Brokovec (١٩٩١): Thyroxine-induced haemolymph protein and ecdystroid increase in the silkworm, *Bombyx mori:* Effect on larval growth and silk production. J. Insect. Physiol. ٣٧ (٢): ١٥٣-١٥٩.

Wigglesworth, V.B. (١٩٥٩): Insect blood cells. Ann. Rev. Entomol. ٤: ١-١٦.

تأثير بعض المساحيق ومنتجات طائفة نحل العسل علي هيموليمف يرقات دودة القز

يحي عبد الفتاح عبد الرحمن[١]، مصطفى حسن حسين[٢] ، صلاح حفنى راتب[٢] و رسمي السيد حسن[١]

١- قسم وقاية النبات – كلية الزراعة – جامعة الأزهر ، أسيوط.

٢- قسم وقاية النبات – كلية الزراعة – جامعة أسيوط.

تم استخدام جرعتين (٥ جم و ١٠ جم) من ١٤ مسحوق (عبارة عن منتجات نحل ومواد نباتية) بإضافتها تعفير علي أوراق التوت وكذلك تركيزين (%) لأربعة عشرة معاملة سائلة (عبارة عن منتجات طائفة نحل العسل وهي: عسل ، حبوب لقاح ، غذاء ملكي ، وبروبوليس ومخاليطهم) رشاً علي أوراق التوت والمقدمة لتغذية العمر الرابع والخامس لدودة القز . تمت دراسة تأثير هذه المعاملات علي صفات الهيموليمف ليرقات العمر الخامس وهي: المواد الصلبة الذائبة الكلية % ، العدد الكلي لخلايا الدم / مم^3 هيموليمف وعلي العد التفريقي % أو أنواع خلايا الدم %. بالنسبة لمحتوي المواد الصلبة: كانت أفضل المعاملات للمساحيق والسوائل تنازلياً هي: حبوب لقاح النخيل المجموعة باليد (١٠ جم) ، حبوب لقاح من طوائف النحل (١٠ جم) ، حضنة ذكور النحل المجففة (٥ جم) ، دقيق صويا منزوع الدهن (١٠ جم)، طلع النخيل (٥ جم) ، صويا (٥ جم) ، حبوب لقاح (٠,٣%)، حبوب لقاح (٥ جم) ، غذاء ملكي (٠,٣%) وعسل نحل (١%) . كان هذا علي حساب الزيادة % في المواد الصلبة في المعاملات عن المقارنة. أما بالنسبة للعدد الكلي لخلايا الدم/مم^3 هيموليمف كانت أفضل المعاملات للمساحيق والسوائل هي: طلع النخيل (٥ أو ١٠ جم) ، حبوب لقاح (١٠ جم) ، غذاء ملكي (٠,٢%) ، حبوب لقاح (٠,٠٢%)، حبوب لقاح + بروبوليس (٠,٢% + ٠,١%) وحضنة ذكور (٥ أو ١٠ جم). كانت معاملات المساحيق أكثر فعالية من معاملات السوائل بالنسبة لمحتوي المواد الصلبة الذائبة الكلية % وبالنسبة للعدد الكلي لخلايا الدم / مم^3 هيموليمف . كان محتوي الخلايا الأولية للدم (بروهيموسيتس) أعلي ما يمكن في المعاملات السائلة الآتية: حبوب اللقاح (٠,٢% و ٠,٣%) ومخلوط حبوب اللقاح مع الغذاء الملكي (٠,٢% + ٠,٠٢%) ، أما محتوي الخلايا البلازمية % والمحببة % والأونيسيتس %، كان أعلي ما يمكن في معاملات: حبوب لقاح + عسل (٠,٢ + ٢%) ، حبوب لقاح + بروبوليس (٠,٢% + ٠,١%) وعسل + غذاء ملكي (٢% + ٠,٢%)، علي الترتيب، بينما كانت الخلايا المغزلية % ، أعلي ما يمكن في المقارنة بالنسبة لباقي المعاملات السائلة المستخدمة. بالنسبة لمعاملات المساحيق كان أعلي تواجد % للخلايا الأولية في معاملات: حبوب اللقاح (٥ و ١٠جم) ، صويا (٥ و ١٠ جم) ، طلع النخيل (٥ و ١٠ جم) وحضنة الذكور (٥جم) . كان أعلي تواجد لباقي أنواع خلايا الدم في معاملات مساحيق أوراق النباتات المجففة التالية: بستاشيا بيضاء ، بدليا والنعناع. أظهر التحليل الإحصائي للنتائج وجود فروق عالية المعنوية بين المعاملات والتركيزات المستخدمة ، كما تمت مناقشة النتائج المتحصل عليها.

قام بتحكيم البحث

أ.د / عبد البديع غانم	**كلية الزراعة – جامعة المنصورة**
أ.د / محمود السيد نور	**كلية الزراعة – جامعة القاهرة**

J. Plant Prot. and Path., Mansoura Univ., Vol. ٢ (٤): ٣٣٢ - ٣٤٠, ٢٠١٠

Table ١. Effect of tested powders on mean of haematological characters of ٥th instar larvae of silkworm.

Characters (Dose) / Treatment	T.S.S. % (٥ gms) Mean	T.S.S. % (٥ gms) % over control	T.S.S. % (١٠ gms) Mean	T.S.S. % (١٠ gms) % over control	T.H.C./mm³ (٥ gms) Mean	T.H.C./mm³ (٥ gms) % over control	T.H.C./mm³ (١٠ gms) Mean	T.H.C./mm³ (١٠ gms) % over control	Types of haemocytes (D.H.C.%) (٥ gms) Prophaem-ocytes	Plasmat-ocytes	Spindle cells	Granular cells	Oeno-cytoides	(١٠ gms) Prophaem-ocytes	Plasmat-ocytes	Spindle cells	Granular cells	Oeno-cytoides
١- Pollen	١٢,٩٠ BC	٢٢,١٥٩	١٣,٧٨ AB	٣٦,٩٧٨	٢٢٩٥ BCD	٩٤,٣٢٦	٢٤٤٣ ABC	١٢٢,٤٩٥	٨٣,١ AB	٣,٩ J	٥,٨ I	٤,٣ LM	٢,٩ D-I	٨٤,٥ A	٢,٨ K	٦,٦ HI	٣,٧ M	٢,٤ G-J
٢- Soya flour	١٣,٧٤ AB	٣٠,١١٣	١٣,٢٩ AB	٣٢,١٠٧	٢٢٨٨ BCD	٩٣,٧٣٤	٢٠٢٠ DEF	٨٣,٩٧٠	٨١,٤ BC	٤,٧ D-J	٦,٦ HI	٥,٢ KL	٢,١ IJ	٨٠,٤ C	٤,٨ D-J	٥,٩ I	٥,١ KL	٣,٨ A-D
٣- Drones brood	١٢,٥٢ BC	١٨,٥٦٠	١٣,٣٠ AB	٣٢,٢٠٦	٢٣١٠ BCD	٩٥,٥٩٦	٢١٢٥ CDE	٩٣,٥٣٣	٧٧,١ D	٥,٥ A-G	٦,٩ HI	٦,٠ JK	٤,٥ A	٧٩,٧ CD	٤,٩ C-J	٦,٣ I	٥,٤ KL	٣,٧ A-D
٤- Palm pollen	١٣,٨٦ AB	٣١,٢٥٠	١٤,٣٧ A	٤٢,٨٤٢	٢٥٩١ AB	١١٩,٣٩٠	٢٧٣٦ A	١٤٩,١٨٠	٨٠,٢ C	٤,٨ D-J	٦,٧ HI	٥,٩ JK	٢,٤ G-J	٨٢,٧ AB	٣,٩ J	٦,٥ HI	٤,٤ LM	٢,٥ E-J
٥- Ascorbic acid	١٢,٦٥ BC	١٩,٧٩١	١١,٩٦ CD	١٨,٨٨٦	٢١٩٣ CDE	٨٥,٦٩٠	١٩٠٥ EF	٧٣,٤٩٧	٧٧,٧ D	٤,٦ E-J	٧,٦ H	٦,٦ IJ	٣,٥ B-E	٧٤,٠ EF	٥,١ B-H	٩,٩ G	٧,٢ HI	٣,٨ A-D
٦- Lantana	١٠,٩٤ DEF	٣,٥٩٨	١٠,٦٢ D-G	٥,٥٦٦	١٦٩٥ FGH	٤٣,٥٢٢	١٤٢٠ G-K	٢٩,٣٢٦	٧٠,١ HIJ	٥,٠ B-I	١٢,٥ ABC	٩,٢ CDE	٣,٣ B-G	٧٣,٥ EFG	٥,٣ A-H	١٠,٥ FG	٧,٠ HIJ	٣,٧ A-D
٧- Eucalyptus	١١,١٦ DE	٥,٦٨١	١٠,٨٩ DEF	٨,٢٥٠	١٧٤٠ FG	٤٧,٣٣٢	١٤٠١ G-K	٢٧,٥٩٥	٧٠,٧ HIJ	٥,٤ A-G	١١,٥ C-F	٩,٣ CDE	٣,١ B-I	٧١,٥ F-J	٥,٠ B-I	١١,٦ C-F	٨,٩ C-F	٣,٠ C-I
٨- Basil	١٠,٥٧ EFG	٠,٠٩٤	٩,٠٢ H	-	١٠٦٨ KLM	-	٨٥٠ M	-	٦٩,٦ IJ	٦,٠ AB	١١,٧ CDE	٨,٦ C-G	٤,١ AB	٧٠,٠ HIJ	٥,٦ A-F	١٢,١ B-E	٨,٥ C-G	٣,٨ A-D
٩- Spearmint	١٠,٤٩ EFG	-	٩,٩٦ E-H	-	٩٥٣ LM	-	٩١٨ LM	-	٦٩,٣ IJ	٥,٨ A-D	١١,٦ C-F	٩,٤ CD	٣,٩ A-D	٦٩,٦ IJ	٦,٤ A	١١,٨ CDE	٨,٢ E-H	٤,٠ ABC
١٠- Thyme	١٠,٩٨ DEF	٣,٩٧٧	١٠,٩٤ DEF	٨,٧٤٧	١٣٦٨ H-K	١٥,٨٣٤	١٤٤١ G-J	٣١,٢٣٨	٦٩,٢ IJ	٤,٦ E-J	١٣,١ AB	٩,٧ BC	٣,٤ B-F	٧١,٧ F-I	٦,٤ A	١١,٢ DEF	٧,٢ HI	٣,٥ B-E
١١- Ziziphus	١٠,٨٩ DEF	٣,١٢٥	١٠,٧٦ DEF	٦,٩٥٨	١٣٩١ G-K	١٧,٧٨١	١١٤٣ J-M	٤,٠٩٨	٧٣,٨ EF	٤,٣ G-J	١٠,٤ FG	٨,٤ D-G	٣,١ B-I	٧٢,٤ E-H	٥,١ B-H	١٢,٤ A-D	٧,٨ F-I	٢,٣ G-J
١٢- Buddleia	٩,٦٤ FGH	-	٩,٣٢ GH	-	١١٩٠ I-M	٠,٧٦٢	٩٣٠ LM	-	٦٩,٩ HIJ	٥,٩ ABC	١١,٦ C-F	٨,٧ C-G	٣,٩ A-D	٧١,١ G-J	٤,٧ D-J	١٢,٤ A-D	٩,٥ CD	٢,٣ G-J
١٣- Vasaka	١٠,٠٨ E-H	-	١٠,١٨ E-H	١,١٩٢	١٢٦٦ IJKL	٧,١٩٧	١١٤٦ J-M	٤,٣٧١	٦٨,٩ J	٤,٦ E-J	١٣,٣ A	٩,٨ BC	٣,٤ B-F	٧٠,٤ HIJ	٤,٢ HIJ	١٢,٠ B-E	١٠,٩ A	٢,٥ E-J
١٤- Guava	١٠,٨٠ DEF	٢,٢٧٢	١١,٠٨ DE	١٠,١٣٩	١٥٣٥ GHI	٢٩,٩٧٤	١٧٠٠ FGH	٥٤,٨٢٦	٧٤,٤ E	٤,٣ G-J	١١,٥ C-F	٧,٦ GHI	٢,٢ HIJ	٧٣,٥ EFG	٥,٤ A-G	١٠,٩ EFG	٨,٥ C-G	١,٧ HIJ
١٥- Control	١٠,٥٦ EFG	٠	١٠,٠٦ E-H	٠	١١٨١ J-M	٠	١٠٩٨ J-M	٠	٧٠,٢ HIJ	٤,٦ E-J	١٢,٠ B-E	١٠,٧ AB	٢,٥ E-J	٧١,٠ HIJ	٥,٧ A-E	١١,٩ CDE	٨,٢ E-H	٣,٢ B-H
LSD ٠,٠٥	١,١٧١				٣٠٣,٤				٢,١٨١	٠,٩٣٦٨	١,٠٢٩	١,٠٥٢	٠,٨٦٤٢	٢,١٨١	٠,٩٣٦٨	١,٠٢٩	١,٠٥٢	٠,٨٦٤٢

Means in a column followed by the same letter are not significantly different at ٠,٠٥ level of probability.

Table ٢. Effect of hive products liquids on mean of haematological characters of ٥th instar larvae of silkworm.

Hive products (con., gm/١٠٠ ml distilled water)	T.S.S. %		T.H.C./mm٣		Types of haemocytes (D.H.C.%)				
	Mean	% over control	Mean	% over control	Prophaem-ocytes	Plasmat-ocytes	Spindle cells	Granular cells	Oeno-cytoides
١- Honey (١ gm)	١١,٦٦ ABC	١٥,٩٠٤	٢١٣٣ AB	٨٠,٦٠٩	٧٦,٥ CD	٤,٦ CDE	٨,٢ D	٦,٨ EF	٣,٩ AB
٢- Honey (٢ gm)	١٠,٠٥ CD	-	١٨١٠ CD	٥٣,٢٥٩	٧٣,٨ FGH	٤,٣ D-G	١٠,٤ C	٨,٨ B	٢,٧ DEF
٣- Royal jelly (٠,٠٢ gm)	١٠,٥٠ CD	٤,٣٧٣	٢٣٥٣ A	٩٩,٢٣٧	٨٠,٩ B	٤,٥ C-F	٥,٨ E	٥,١ G	٣,٧ ABC
٤- Royal jelly (٠,٠٣ gm)	١٢,٢٧ AB	٢١,٩٩٨	٢٠٤٦ BC	٧٣,٢٤٣	٧٦,٤ CD	٤,٨ CDE	٧,٩ D	٧,١ DE	٣,٨ AB
٥- Propolis (٠,١ gm)	١٠,٠٨ CD	٠,١٩٨	١٦٧٠ D	٤١,٤٠٥	٧٦,٦ CD	٥,٠ BCD	٨,١ D	٦,٣ EF	٤,٠ AB
٦- Propolis (٠,٢ gm)	٩,٦٢ D	-	١١٦٠ E	-	٧٢,٤ GHI	٣,٧ FGH	١١,٨ AB	٩,٨ AB	٢,٣ EFG
٧- Pollen (٠,٢ gm)	١١,٤٨ BCD	١٤,١٥	٢٣٤٥ A	٩٨,٥٦٠	٨٥,٢ A	٣,٣ H	٥,١ E	٣,٦ H	٢,٨ CDE
٨- Pollen (٠,٣ gm)	١٣,٠٨ A	٣٠,٠١٩	١٩٤٠ BC	٦٤,٢٦٧	٨٢,٦ B	٤,٢ D-G	٦,٠ E	٥,٤ G	١,٨ FG
٩- Pollen + Royal jelly (٠,٢ + ٠,٠٢ gm)	١١,٤١ BCD	١٣,٤٤٩	٢٠٩٣ AB	٧٧,٢٢٢	٨١,٠ B	٣,٥ GH	٧,٧ D	٥,١ G	٢,٧ DEF
١٠- Pollen + Honey (٠,٢ + ٢ gm)	١٠,٦٠ CD	٥,٤٢٧	١١٣٨ E	-	٧٤,١ EFG	٥,٨ A	١٠,٢ C	٧,٦ CD	٢,٣ EFG
١١- Pollen + Propolis (٠,٢ + ٠,١ gm)	١١,٠٣ BCD	٩,٦٧١	٢٣٣٣ A	٩٧,٥٤٤	٧٢,٠ HI	٤,٢ D-G	١٢,٣ A	١٠,٠ A	١,٥ G
١٢- Pollen + Propolis (٢ + ٠,١ gm)	٩,٨٠ D	-	٩٧٣ E	-	٧٤,٧ DEF	٤,٨ CDE	١١,١ BC	٦,٠ FG	٣,٤ A-D
١٣- Propolis + Royal Jelly (٢ + ٠,٠٢ gm)	١٠,٥٤ CD	٤,٧٧١	١١٦٣ E	-	٧٦,٠ CDE	٥,١ ABC	٨,١ D	٦,٦ EF	٤,٢ A
١٤- Propolis + Royal Jelly (٠,١ + ٠,٠٢ gm)	١٠,٢٦ CD	٢,٠٤٧	٢٠٤٣ BC	٧٢,٩٨٨	٧٧,٠ C	٥,٧ AB	٨,٤ D	٤,٩ FG	٤,٠ AB
١٥- Control	١٠,٠٦ CD	٠	١١٨١ E	٠	٧١,٠ I	٥,٧ AB	١١,٩ AB	٨,٢ C	٣,٢ BCD
LSD ٠,٠٥	٠,٩٧٢		٢٤٤,١		١,٨٨٨	٠,٧٦٤٦	٠,٩٢٥٢	٠,٨٣٢٩	٠,٨٧٠٧

Means in a column followed by the same letter are not significantly different at ٠,٠٥ level of probability.

J. Plant Prot. and Path., Mansoura Univ., Vol. ٢ (٤): ٣٣٢ - ٣٤٠, ١٠ ١