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Effect of insecticide (mosa-plan& confidor)

On eggplant jassid

اثر المبيدات (موسابلان &كونفدور) علي حشرة الجاسد في البادنجان

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Dedication

To my dear father Abdillahi Mohamed

To my mother Seynab Abdi Mohamed who gave and still giving

To my lovely sisters and brothers

To my best supervisor Dc. AMANI HAMED

To all the family friends and colleagues

To everyone who tried to guide me to a better life I dedicate this work

Mohamed Abdillahi Mohamed

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All thanks and praises to Allah the lord of the mankind and all existing creature so the prayers and peace be upon the prophet Mohammed.

I wish to express my deepest gratitude, sincere appreciations to my supervisor DC. AMANI HAMED

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ABSTRACT

The major eggplant insect pest jassid *empoasca lybica,* one experiment conducted at shambat research station in Sudan during winter season 2016/2017 the potential insecticide mosa-plan20%SL (acetamiprid) {with three different concentrations } was investigated against the eggplant jassid in comparison with standard insecticide CONFIDOR 200 SL (imidacloprid) randomized complete block design (RCBD) with three replicated used with 5 treatments : mosa-plan 20%SL (acetamiprid) at 0.0375 L/fed (7.5 g.a.i. /fed),mosa-plan 20%SL (acetamiprid) at 0.03 L/fed (6g.a.i. /fed) ,mosa-plan 20%SL (acetamiprid) at 0.0225 L/fed (4.5 g.a.i. /fed) , Confidor 200 SL (imidacloprid) at 0.2 L/fed (40 g a.i. /fed) as stander and Non treated control the jassid insect were counted a pre count before spray and post count for each spray that followed .

The insecticides mosa-plan (three different concentrations) and the standard insecticide confidor were significantly different from the untreated control blots in the number of jassid insects in the plant (leaves). While the performance of insecticide mosa-plan for reducing population of jassid insects on eggplant was affective, was almost the same at standard insecticide confidor

The collected date analyzed by using statistics 8.

الملخص

تم اجراء تجربه خلال الموسم الشتوي 2016-2017 بمزرعة محطة ابحاث شمبات لتحديد اثر المبيد موسابلان (دات ثلاث تراكيز مختلفه) و (كونفدور) في مكافحة الدبابه الخضراء (الجاسد) في مجصول البادنجان

تم تخطيط التجربه باستخدام القطاعات العشوائية المتكامله باستخدام خمسه معاملات مكرره ثلاث مرات

وتم تطبيق المعاملات الثلاثه: موسابلان 0.0375لتر للفدان , موسابلان 0.03 لتر لفدان ,

موسا بلان 0.0225 لتر للفدان ,كونفد ور 0.2 لتر للفدان بالاضافه للشاهد غير معامل تم حساب عدد الحشرات في النبات بعد كل رشه , دلت النتائج علي ان المبيد الحشري موسابلان والمبيد الحشري كونفدور اظهرا خفض في عدد الحشرات مقارنة بالشاهد خلال فترة التجربه و بينما لا توجد فروقات معنويه بين موسابلان و كونفدور حتي الرشه الاخيره .

خلصت الدراسه علي ان المبيد الحيوي موسابلان يمكن استخدامه بتوافق مع الطرق الاخري في برنامج الادارە المتكامله للافات IPM الخاص بحشرة الجاسد .

Chapter 1

1.1 Introduction

The eggplant (Solanum melongena) is a native of the subtropical areas of south-eastern Asia and was introduced into Europe by early Arab traders. It is a member of the Solanaceae family, which includes other vegetable crops such as tomatoes, potatoes and capsicums. Eggplants have been widely grown in southern Europe, the Middle East and Asia for hundreds of years. The fruit, also known as aubergine (France), melanzana (Italy) or brinjal (India), is considered something of a delicacy.

Eggplant is a popular vegetable round the world, the history of eggplant into the Sudan is not known but probably it came through Egypt (Fuchsia, 2006). Eggplant Solanum melongena L. is one of the major vegetable crops in the country, mainly at the central. It can be cooked and eaten as vegetable, prepared in variety of different ways, and be stable in any diet. It is very rich in vitamins, minerals and very efficient in the utilizations of land area. One cooked cup contains calories 27.7 grams, protein 0.82 gram, carbohydrates 6.57 grams, dietary fiber 2.47 grams, phosphorus 21.78 mg, potassium 245.52mg and folate 14.26 mg.

A large selection of varieties makes eggplants available in several colors for example, (purplish black, red, white, and variegated)

And shapes for example- (egg-shaped, elongated and round)

Eggplant suffers from different types of insect pests, diseases, nematodes and weeds. The major diseases of eggplant reported include powdery mildew Leveillula taurica Lev., leaf spot Alternaria solani Ell. And Damping-off pythium debaryarnum Hesse.

The major insect pests of eggplant reported include jassid Empoasca lybica (E. lybica) De Berg, Aphid (Aphis Gossypii Lev.), and whitefly Bemisia tabaci Genn. However, eggplant jassid E. Lybica considered as a major pest of the foliage causing considerable damage to the leaves (hopper burn) and results in shedding of flowers and small fruits (Schmutterer, 1969).

1.2 Objectives

To study the effect of insecticide mosa-plan and confidor for reducing jassid population on eggplant .

Chapter 2

Literature review

2.1 Eggplant

2.1.1 Classification

Kingdom = plantae
Division = tracheoohyta
Class = magnoliopsida
Order = solanales
Family= solanaceae
Genus = *solanum l. -nightshade*
Species = *solanum melongena l.- eggplant*

2.1.2 Origin and distribution

Eggplant is native to India it has been cultivated in southern and eastern Asia since prehistory but appears to have become known to the western world no earlier than ca. 1500 C.E...The first known written record of the eggplant is found in Qí mín yào shù.

And it is a popular vegetable crop grown in the subtropics and tropics. The name eggplant developed in the United States, Australia, New Zealand and Canada.

2.1.3 Uses

This vegetable is quite diverse and more versatile, both in the garden and in the kitchen. Eggplant has chemicals that can cause digestive upset if eaten raw, so is usually cooked. It can be grilled, stuffed, roasted, served in soups and stews and on kebabs, and used in curries and stir-fries.

2.1.4 Human health benefits

Eggplant is nutritious, being low in calories, fat, sodium and is a non starchy fruit that is cooked as a vegetable. It contains a large volume of water. It is good for balancing diets that are heavy in protein and starches. It is high in fiber and provides additional nutrients such as potassium, magnesium, folic acid, vitamin B6 and A

2.1.5 Nutritional value

Nutritional facts (100gr)

properties	Amount
Water (g)	92.0
Protein (g)	1.6
Fat (g)	0.2
Fiber (g)	1.0
Carbohydrates (g)	4.0
Calcium (mg)	22.0
Iron (mg)	0.9
Vitamin b1 (mg)	0.08
Vitamin b2 (mg)	0.07
Niacin (mg)	0.7
Vitamin c (mg)	6.0
Energy value (kj)	100.0

2.1.6 Cultivation practices

2.1.6.1 Soil and climatic requirements

Eggplant is a warm-season crop and does not tolerate frost. A long growing season of 80 days is required for the transplanted crop. Optimal temperatures for eggplant production are 26 °C days and 20 °C nights. Plant growth slows and pollination problems occur at temperatures below 17 °C or above 35 °C. Flowering is not affected by day length. Cooler temperatures can reduce fruit set. Higher temperatures and high humidity levels also reduce yields. Eggplant can tolerate drought and excessive rainfall. It will not tolerate extended periods of saturated soil owing to the build-up of root-rotting pathogens. Eggplant does well in a variety of soil textures. Previous crop residue must be stubble-disked to improve soil aeration and to adequately bury organic matter for decomposition. Eggplant grows best with a soil pH of 5,5 to 6,5. Eggplant is usually grown in light or sandy loam soils that provide good drainage and favourable soil temperatures. Eggplant will root to a depth of 90 to 120 cm; therefore, sandy loam or silt loam soils free of physical barriers are better for proper plant growth and development.

2.1.6.2 Planting

Eggplant crops are normally grown from transplants, however a few growers use direct seeding. Desert growers plant spring transplants on southern-sloping beds that run from east to west. They use brush paper 3 and wooden stakes to protect the crop from spring frosts. The butcher-type brown paper is held in place with wooden stakes placed every 60 cm along each row. The paper stake structure is placed at an 80-degree angle to reflect sunlight downwards, warming the soil and young plants. The stakes must hold the paper securely, otherwise wind can cause it to vibrate and tear. Clear, polyethylene mulch is also used on the spring crop. Some small-scale growers use mulch in combination with brush paper and stakes. Black-plastic mulch increases yields by controlling weeds, conserving moisture and warming the soil. In-row spacing of eggplant is 30 to 60 cm. The crop can be grown, using a row width depending on the space needed by harvest workers. Growers usually plant 8 rows and skip 2 rows to make roadways for harvest operations. Growers are experimenting with a bed spacing of 45 to 70 cm in an effort to maximize sunlight penetration onto the fruit, improving fruit color. Some growers remove the lower leaves and flowers and stake the plants in an effort to reduce fruit rot that occurs when the fruit touches the soil.

2.1.6.3 Fertilization

The nitrogen (N) requirement for eggplant is approximately 168 to 224 kg/ ha. Preplant fertilizers are usually broadcasted. A typical blend is 90 to 134 kg/ha each of phosphorus (P) and potassium (K) and 22 to 45 kg/ha of N. During the growing season, 2,3 to 4,5 kg of N is applied each week for the period of vegetal growth. At early flowering, 7 to11 kg of N is applied each week. During fruit enlargement, 5 to 7 kg of N is applied each week. The N is water run by most small growers.

2.1.6.4 Irrigation

Eggplant can be grown with furrow or drip irrigation. A crop of furrow irrigated eggplant uses approximately 1 850 m3 of water. Some growers use black plastic mulch and drip tape to control weeds, moisture and soil temperature in spring plantings. Critical watering periods are at flowering, fruit set and enlargement. The volume of water applied, depends on the 4 time of the year and stage of plant growth. Most of the water and nutrient absorbing roots are in the top 45 cm of the soil. Irrigation should be managed to maintain good soil moisture in this root zone.

2.1.6.5 Pollination

Eggplant is self-fertile as its flower contains both male and female parts. Flowers are usually formed on opposite leaves. Flowering is considered day neutral.

Eggplant is not well suited for greenhouse production because it will not set fruit in extremely high or low temperatures. Fruit abscission can result if day temperatures exceed 35 °C. If night temperatures drop below 16 °C, pollen deformity increases and less fruit is produced. Flowering and fruit setting begin 6 to 8 weeks after transplanting. Market size fruit is ready approximately 3 weeks after flowering.

2.1.6.6 Weed control

Eggplant is slow to become established and cannot compete with aggressive weeds. Weeds also harbour damaging insects and diseases. Weeds are controlled either by physical methods or chemical control. Physical methods, such as hand weeding, cultivation and mulching, are quite frequently used on small vegetable farms. Only shallow cultivation is necessary. Mulching with black plastic mulch effectively controls weeds and reduces labour needs. Natural organic mulches, such as rice straw, will conserve moisture and add organic matter to the soil. Chemical weed control is especially popular in places where labour is expensive. Suitable herbicides include Lasso and Sencor (metribuzin).

2.1.6.7 Pest and disease control

Herbicides, insecticides and fungicides should always be used in compliance with the label instructions.

2.1.6.7.1 Insects

Many insect pests are attracted to eggplant, jassid (empoasca lybica)

Spider mites (Tetranychus spp.), green peach aphids (Myzus persicae), lygus (Lygus spp.), flea beetles (Chrysomelidae) and wireworms (Elateridae) can be destructive to eggplant. Spider mites are especially harmful and should be treated as temperatures become warmer. Flea beetles are usually a problem only in young plants. Fields should be closely monitored during the flowering period as lygus will feed on flowers and cause flower drop. Root-knot nematodes (Meloidogyne spp.) can cause plants to wilt and leaves to yellow.

2.1.6.7.2 Diseases

1. Leaf spot and fruit rots caused by Phomopsis vexans are characterized by circular, brownish spots on fruit and leaves. Fruit rot may appear during postharvest transport even when symptoms are not evident at the time of harvest, we can control this disease by doing this:-

• Crop rotation with any other crop rather than solanaceous crop.

• The field should be cleaned as soon as the disease is detected in the field, i.e. the diseased fruit should be plucked and burnt.

2. Early blight caused by Alternaria solani can result in dieback known as collar rot in seedlings. Foliage can be affected at all growth stages, and fruit can drop owing to infection. This fungus is favoured at temperatures between 16 and 32 °C. Stressed plants are more susceptible than healthy plants, we can control this disease by doing this:-

• Observing proper field sanitation

• Using certified disease-free seed

• Own seed should be water/heat treated

2.1.6.8 Harvesting and handling

Harvest of eggplant usually starts 75 to 90 days after transplanting or 15 to 35 days after flowering expansion (anthesis). Fruit is harvested when it reaches market size, and the skin is glossy, but before seeds begin to enlarge significantly and mature. Varieties with elongated fruit take more time to ripen. Over mature eggplants become pithy and bitter. Fruit should be removed often to encourage continued fruit set. At market maturity, the fruit stem hardens and a sharp knife is needed to cut fruit from plants. The length of stem left on the plant can vary from 2, 5 to 5, 0 cm for American varieties and 2, 5 to 7,5 cm for Asian varieties. Harvesting is done by cutting the stem rather than by pulling the fruit. The fruit is dumped in a water bath for washing and cooling prior to packing. Fruit should be handled and packed carefully to avoid skin abrasions and puncturing. Some types of eggplant have skin that can be damaged easily. Careful harvesting and handling practices should be followed to avoid bruising and compression injuries. The fruit is packed by 18s and 24s into fiberboard containers. Some growers cut plants to 45 cm, allowing them to grow out again for autumn harvest. This practice depends on current market prices and plant vigour.

2.1.7 Production and economic importance

Eggplant is an economically important vegetable crop in Asia and Africa

Production of eggplant is highly concentrated, with 90 percent of output coming from five countries in 2010. China is the top producer (58 percent of world output) and India is second (25 percent), followed by Egypt, Iran and Turkey. More than 4,000,000 acres (1,600,000 hectares) are devoted to the cultivation of eggplant in the world (Food and Agricultural Organization of United Nations 2010).

2.1.8 Medicinal importance

The eggplant is used mainly as a food crop, but it does also have various medicinal uses that make it a valuable addition to the diet. In particular the fruit helps to lower blood cholesterol levels and is suitable as part of a diet to help regulate high blood pressure.

The fruit is antihaemorrhoidal and hypotensive. It is also used as an antidote to poisonous mushrooms. It is bruised with vinegar and used as a poultice for cracked nipples, abscesses and haemorrhoids

The leaves are narcotic A decoction is applied to discharging sores and internal haemorrhages A soothing and emollient poultice for the treatment of burns, abscesses, cold sores and similar conditions can be made from the leaves

Aubergine leaves are toxic and should only be used externally

The ashes of the peduncle are used in the treatment of intestinal haemorrhages, piles and A decoction of the root is astringent.

2.1.9 Grading and marketing

If the fruits are harvested regularly at a definite size there will be no need for grading except to discard all diseased misshapen or bruised fruit.

The individual fruits are same times wrapped on paper or placed in small paper sacks before being packed in crates, bags , or baskets for shipment . the the type of size and container varies from bushel and $^5/_8$-bushel baskets to pepper and berry crates, but the 30 pound bushel basket, hamper, and crate are standard containers.

Eggplants are sold for distant as well as for local markets. Attractive packaging and proper handling are necessary for maximum returns. Retail preference appears to be small, uniform sized fruits .

2.2 Jassid (Empoasca lybica)

Empoasca lybica is a small and plant-juice sucking insect belonging to the cicadellidae (homoptera). It is polyphagous and causes a lot of damage. It punctures the lower epidermis and mesophyl cells are stung, torn disordered and filled with salina sheath material by the stylets on their way to the phloem.

The leaf turns yellow and the edges start curling. This phenomenon is called

(Hopper burn).

Empoasca lybica is a pest on many important crops such as cotton, eggplant, and grape vine. Its found in the major part of northern of Africa, in Sudan more than 60 plants have been recorded as host plant of this pest.

2.2.1 Classification

Kingdom = Animalia
Phylum = Arthropoda
Class= insecta
Order= hemiptera
Family= cicadellideae
Sub-family= typhlocybinea
Genus= nempoasca
Species= empoasca lybica

2.2.2 Geographical distribution

Mediterranean basin, Arabia, India, East, South and North Africa.

2.2.3 Morphology

Empoasca lybica is elongated, wedge-shaped and approximately 2.5 mm in length the body is pale green with semi-transparent, shimmering wings, it is polyphagous the eggs are laid preferably near the insertion point of the leaf petiole or roughly halfway along the midvein, the eggs are greenish relatively large and cylindrical in shape .

The emerging nymph is initially colourless and later becomes yellowish-green,

It is frog-shaped and flattened.

2.2.4 Host plants

Eggplant, cotton, grapevines, and many solanaceae.

2.2.5 Life cycle

2.2.5.1 Egg

Eggs are curved, elongated and yellowish white in color, and deeply embedded in the midribs of large veins on the undersurface of the leaves.

2.2.5.2 Nymph

Nymphs are flattened, pale yellowish green with characteristic way of moving diagonally in relation to their body, and remain confined to the lower surface of leaves during daytime.

2.2.5.3 Adult

Adults are about 3.5 mm in length. They are elongate and wedge shaped with pale green body. Forewings and vertex have black spots. Adults are very active with side way movements but quick to hop (hence referred as leaf hoppers) and fly when disturbed.

2.2.5.4 Life history

The female inserts about 15 eggs inside leaf veins the incubation period ranges from 4-11 days. The nymphal period occupies 7-21 days depending upon weather conditions. Eleven generations have been estimated to occur in a year. Nymphs moult five times. Average number of eggs laid by female is about 15 with a maximum of 29.

2.2.5.5 Seasonal Dynamics

Nymphs and adults have different seasonal fluctuation patterns. Jassids survive on a variety of wild hosts during dry season. Populations of the jassids occur throughout the year. The fluctuations of nymphal and adult populations vary within season. The nymphal population build up occur from the second week of seedling emergence.

2.2.6 Economic importance

This jassid is a serious pest of eggplant; the presence of leafs in mid-summer induces damage symptoms and reductions in the soluble solids.

Infested leaves change color, appear scorched and often curl downwards. Severe attacks result in massive shedding of leaves, exposing them to the sun, thus causing berry “scalding”, reducing eggplant quality and quantity. In addition, such injury reduces the plant nutrient reserves for the following season. The pest also seriously damages solanaceous crops, such as pepper, potatoes and tomatoes, its injury being especially severe on eggplants.

2.3 Jassid on eggplant

2.3.1 Symptoms

Initial symptoms appear as chewing patterns on the lower leaf side. The infested leaves turn yellowish and later show burnt patches, curling upward along the margins as the disease progresses. Plants generally show a stunted growth and bushy appearance, with shorter internodes, large number of branches and buds. Smaller, deformed leaves also have shorter petioles, thereby the common name "little leaf disease". An infestation of the field can lead to a symptom called "hopper-burn” (whole leaves turn brown), defoliation, sterile flowers and reduced fruit stands. This is followed by heavy yield loss.

2.3.2 Trigger

The adults are small, longish, slim and bright green to yellow-greenWith shimmering wings, depending on the species. The female lays about 50 tiny, greenish and banana-shaped eggs into the large leaf veins or the petioles. After about 6-10 days the larvae hatches. There are different larval stages, the older one is about 2 mm, yellowish-green and looks pretty much like the adult insect but smaller and without wings. Usually they are located on the lower leaf side.

The larval stage lasts for about 14-18 days. Through warm and wet weather periods the population growth is high and there can be several generations within a season. Jassids are also vectors for virus and bacteria, and therefore an infestation may be very damage

2.3.3 Control

2.3.3.1 Biological control

Parasitoid wasps species such as anagrus flaveolus and stethynium

tridavatum can be used to control the populations of jassids. Leaf extracts of neem, tobacco and eucalyptus can be sprayed onto the foliage.

2.3.3.2 Chemical control

Whenever possible, opt for an integrated approach. If insecticides are necessary, products containing Malathion and dichlorvos can be used as foliar spray applications. Bear in mind that dichlorvos is toxic and has a negative impact on human health as well as on animals such as bees, fish and birds.

Chapter 3

Material and methods

3.1 Shambat Research Station

The experiment was conducted at Shambat Research Station farm during winter season 2016/2017. Eggplant variety long purple was sown in nursery on 26 November 2016 and transplanted to the field on 20 January 2017.

The experiment was laid in randomized complete block design (RCBD) with three Replicates. The plot size used was 4×5 m^2 with 5 rows, and the spacing was 40 cm between plant holes.

Count for jassid was carries early in the morning by taking randomly two top , one middle and two bottom leaves on five plants one day before spray (pre spray count) and 2,4,7,10 and 14 days after spray (post spray counts). A knapsack Sprayer with spray volume of 90-100 liters of water per feddan was used. Three Sprays were applied through the season for jassid on 10/3/2017, 19/3/2017 and 7/4/2017.

All other cultural practices were done as per ARC standard. At the end of the Season the total yield was calculated. Transformation to $\sqrt{x + 0.5}$ was made where necessary and data was statistically analyzed using ANOVA and Duncan's multiple range test (DMRT) for means separation between the treatments.

The insecticides and their doses rate/fed. Were as follows:

1- mosa-plan 20%SL (acetamiprid) at 0.0375 L/fed (7.5 g.a.i. /fed)

2- mosa-plan 20%SL (acetamiprid) at 0.03 L/fed (6g.a.i. /fed)

3- mosa-plan 20%SL (acetamiprid) at 0.0225 L/fed (4.5 g.a.i. /fed)

4- Confidor 200 SL (imidacloprid) at 0.2 L/fed (40 g a.i. /fed)

5- Non treated control

Chapter 4
Results & discussion

4.1 Table 1

Treatment		First spray (march 10)		
No	Pre count Mar 9	Count 1 Mar 12	Count 2 Mar 15	Count 3 Mar 17
1- mosa-plan 20%SL (acetamiprid) at 0.0375 L/fed (7.5 g.a.i. /fed)	6.2333a	3.7667b	4.3333b	7.6000ab
2- mosa-plan 20%SL (acetamiprid) at 0.03 L/fed (6g.a.i. /fed)	6.2667a	4.7000b	4.5667b	7.6667ab
3- mosa-plan 20%SL (acetamiprid) at 0.0225 L/fed (4.5 g.a.i. /fed)	6.5333a	5.4667ab	4.1667b	7.7333ab
4- Confidor 200 SL (imidacloprid) at 0.2 L/fed (40 g a.i. /fed)	6.7667a	5.7667ab	5.0667b	6.0667b
5- Non treated control	6.4667a	7.6000a	7.6000a	8.3333a
S.E.(±)	0.5274	0.6908	0.5433	0.5639
C.V.(%)	14.6	21.91	18.29	13.6

Means followed by the same letter in the same Colum are not Significantly different at {P<0.05} according to (DMRT)

4.2 Table2

Treatment		Second spray (march 19)					
treat	Pre count Mar 17	Count 1 March 22	Count 2 March 24	Count 3 March 26	Count 4 March 29	Count 5 March 31	Count 6 April 6
1- mosa-plan 20%SL (acetamiprid) at 0.0375 L/fed (7.5 g.a.i. /fed)	7.6000ab	7.4000a	7.7333a	6.2333b	7.2667bc	7..1000b	6.2333b
2- mosa-plan 20%SL (acetamiprid) at 0.03 L/fed (6g.a.i. /fed)	7.6667ab	9.0667a	8.4000a	7.5333ab	8.0667abc	7.2000b	6.2333b
3- mosa-plan 20%SL (acetamiprid) at 0.0225 L/fed (4.5 g.a.i. /fed)	7.7333ab	8.1667a	7.6000a	8.2333ab	8.5667ab	6.2333b	6.6000b
4- Confidor 200 SL (imidacloprid) at 0.2 L/fed (40 g a.i. /fed)	6.0667b	7.4333a	7.6333a	6.6667b	6.8667c	6.1000b	6.6333b
5- Non treated control	8.3333a	9.0000a	9.0667a	9.7000a	9.2333a	9.9333a	11.067a
S.E.(±)	0.5639	0.4417	0.6799	0.5837	0.4493	0.7587	1.4416
C.V.(%)	13.6	9.31	14.56	13.18	9.73	17.97	33.96

Means followed by the same letter in the same Colum are not Significantly different at {P<0.05} according to (DMRT)

4.3 Table 3

Treatment	Third spray (April 7)				
NO	Pre count April 6	Count 1 April 9	Count 2 April 12	Count 3 April 14	Count 4 April 16
1- mosa-plan 20%SL (acetamiprid) at 0.0375 L/fed (7.5 g.a.i. /fed)	6.2333b	4.8333ab	3.9333b	2.1000b	3.3333a
2- mosa-plan 20%SL (acetamiprid) at 0.03 L/fed (6g.a.i. /fed)	6.2333b	4.3000ab	4.0000b	2.7333b	3.7000a
3- mosa-plan 20%SL (acetamiprid) at 0.0225 L/fed (4.5 g.a.i. /fed)	6.6000b	3.3667b	1.9333b	2.3000b	2.6667a
4- Confidor 200 SL (imidacloprid) at 0.2 L/fed (40 g a.i. /fed)	6.6333b	4.2000ab	2.7667b	2.8000b	4.1667a
5- Non treated control	11.067a	8.5333a	7.9667a	7.0333a	6.0000a
S.E.(±)	1.4416	1.5937	1.2700	1.1679	1.5026
C.V.(%)	33.96	54.70	53.93	59.61	65.50

Means followed by the same letter in the same Colum are not Significantly different at {$P<0.05$} according to (DMRT)

4.4 Discussion

The number of jassid insects encountered at shambat research station farm (SRSF) with five different treatments and three replicates was presented in table 1,2 and 3 singnificant differences between both synthetic insecticide mosa –plan (acetamiprid)and synthetic insecticide confidor (imidacloprid) was shown compared with the untreated control up to the last week

Results date in table 1 showed the number of jassid insects on eggplant in the first spray. No significant differences ($p \leq 0.05$) obtained between all treatments in the first spray

However, there were significant differences between both mosa-plan (acetamiprid) and confidor (imidacloprid) and untreated control in the second and third spray.

Results also showed significant differences between mosa-plan and confidor in the last spray with superiority of the mosa-plan over confidor

Chapter 5

5.5 Conclusions & Recommendations

The present study concluded that the insecticide mosa plan was more effective in

Reducing population of jassid insects when compared to the control it was almost similar to the standard insecticide (confidor) in this manner, despite the drop of jassid population due to the effect of standard insecticide immediately after each spraying.

However the insecticide mosa-plan performance was almost the same as the standard insecticide. More over mosa-plan could effectively increase the yield of eggplant compared to the control with no significant difference from the standard insecticide.

However the global trends of declining the extensive use of the synthetic insecticide will still encourage the inclusion of these products with other control tactics in IPM

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