SUMMARY

Since the great majority of conventional pesticides are imported as ready to use formulations. Therefore, efforts should be directed towards using the local raw materials and products as auxiliary material in preparation of active ingredients as a suitable formulation, which would contribute with producing cheep pesticides, decreasing pest control costs and increasing the national income. In this study the physico-chemical properties, pesticidal efficiency and residues on plant of the most important conventional insecticides (chlorpyrifos, methomyl), fungicide (copper oxychloride) and herbicide (glyphosate), and using the local raw materials and products in preparation of their active ingredients as suitable formulation and evaluation of their pesticidal efficiency had been extensively studied.

1- The physico-chemical properties of the commercial formulation pesticides

1-1- Chlorpyrifos insecticides

Physico-chemical properties were determined for the commercial formulation insecticides, chlorpyrifos, as 48% emulsifiable concentrate produced by different companies under trade names (Helban, Pyriban A and Pestiban) according to the world specifications as emulsion stability test, foam test, free acidity or alkalinity, flash point, accelerated storage and cold stability test. The physical phenomenon tests were carried out for these commercial insecticides as surface tension, viscosity, refractive index, density and specific gravity. Also, the physico-chemical properties of the spray solution of the commercial formulation insecticides at field dilution rate were determined as surface tension, viscosity, pH value and electrical conductivity. Results of the above tests indicated that all commercial formulation insecticides, chlorpyrifos, passed these tests and could be considered as a successful formulations according to the world recommendations.

1-2- Methomyl insecticides

The commercial formulation insecticides, methomyl, as 90% soluble powder produced by different companies under trade names (Lannate, Hauyang and Kuik) passed through many tests according to the world specifications as solubility test, foam test, free acidity or alkalinity, bulk density, % particle size and accelerated storage test. Also, the physico-chemical properties of the spray solution of the commercial formulation insecticides at field dilution rate were carried out as surface tension, viscosity, pH value and electrical conductivity. Results of the above tests indicated that all commercial formulation insecticides, methomyl, passed these tests and could be considered as a successful formulations according to the world recommendations.

1-3- Copper oxychloride fungicides

The commercial formulation fungicides, Copper oxychloride, as 50% wettable powder produced by different companies under trade names (Curenox, Unicopper and Copral) passed through many tests according to the world specifications as suspensibility test, foam test, free acidity or alkalinity, bulk density, wettability, wet sieve test and accelerated storage test. Also, the physico-chemical properties of the spray solution of the commercial formulation fungicides at field dilution rate were carried out as surface tension, viscosity, pH value and electrical conductivity. According to the obtained results of the above tests, it was found that all commercial formulation fungicides, copper oxychloride, passed these tests and could be considered as a successful formulations according to the world recommendations.

1-4- Glyphosate herbicides

Physico-chemical properties were determined for the commercial formulation herbicides, glyphosate, as 48% soluble liquid produced by different companies under trade names (Round up, Herbazed and Herphosate) according to the world specifications as miscibility test, foam test, free acidity or alkalinity, flash point, accelerated storage and cold stability test. The physical

phenomenon tests were carried out for these commercial herbicides as surface tension, viscosity, refractive index, density and specific gravity. Also, the physico-chemical properties of the spray solution of the commercial formulation herbicides at field dilution rate were determined as surface tension, viscosity, pH value and electrical conductivity. According to the obtained results of the above tests, it was found that all commercial formulation herbicides, glyphosate, passed these tests and could be considered as a successful formulations according to the world recommendations.

2-1- The physico-chemical properties of the constituents of different formulation types

2-1-1- Active ingredients

Many tests were carried out for all tested active ingredients: chlorpyrifos, methomyl, copper oxychloride and glyphosate as solubility test, free acidity or alkalinity, density and melting point to determine their suitable type of formulation. It was found that chlorpyrifos which insoluble in water and soluble in all solvents could be prepared as emulsifiable concentrate, methomyl which soluble in water could be prepared as soluble powder, copper oxychloride which insoluble in water and in all solvents could be prepared as wettable powder and glyphosate as soluble liquid. It was clear from the free acidity or alkalinity test that slight acidic or alkaline adjuvant should be used in the formulations.

2-1-2- Solvents

The local tested solvents (xylene, DMF and n-butanol) passed through several tests as solvability for active ingredients and surfactants, free acidity or alkalinity, flash point and surface tension. These properties show clearly that the tested solvents had moderate flash point and slightly alkaline which agree with world recommendations, where xylene was considered as a suitable solvent for local formulations of emulsifiable concentrates.

2-1-3- Carriers

The physico-chemical properties of the local carriers (talc and kaolin) were carried out to ensure that these carriers are suitable to make successful wettable powder as particle size, free acidity or alkalinity, wettability, density, bulk density and pka.

2-1-4- Surface active agents

Results obtained indicated that PEG 600 MO, PEG 400 ML, PEG 600 MS and PEG 600 MP give emulsion in water and soluble in xylene, therefore they should be used as emulsifiers for preparation of emulsifiable concentrates, while surfactants soluble in water as potassium oleate, PEG 600 ML, SDS, Tween 80 and Triton x-100 should be used as wetting and spreading agent for preparation of soluble powder and soluble liquid formulations.

2-2- Formulation of the used technical pesticides (active ingredients) as suitable formulations

Many trials were conducted to prepare chlorpyrifos as 48 % EC using solvent xylene and cosolvent as DMF or n-butanol with many non-ionic surfactants as emulsifiers, also to prepare methomyl as 90% SP using surfactants as wetting and spreading agents, to prepare copper oxychloride as 50% WP using carrier as talk and kaolin with surfactants as suspending, wetting and spreading agents and to prepare glyphosate as 48% SL using surfactants as wetting and spreading agent, then determination their physico-chemical properties as mentioned before in the physico-chemical properties of the commercial formulation pesticides. Results obtained indicated that only formulation codes CP23, CP24, CP32 and CP33 for chlorpyrifos passed successfully all tests, formulation codes ME1, ME2, ME3, ME4 and ME5 for methomyl passed successfully all tests, formulation codes CO9, CO11, CO12, CO14, CO15 and CO18 for copper oxychloride passed successfully all tests and formulation code GL5 for glyphosate passed successfully all tests. The physical phenomenon tests were determined for the locally successful prepared

formulation, also the physico-chemical properties of their spray solution at field dilution rate were determined by the same method as mentioned before in the commercial formulations.

3-1- The insecticidal efficiency of the locally and commercially formulated chlorpyrifos

The experiment was carried out for the commercially formulated chlorpyrifos and the most successfully local formulation against 4^{th} instar larvae of cotton leafworm infested cotton plant. Results obtained indicated that Helban and CP32 which have the best physico-chemical properties of the spray solution gave the higher insecticidal efficiency.

3-2- The insecticidal efficiency of the locally and commercially formulated methomyl

The experiment was carried out for the commercially formulated methomyl and the most successfully local formulation against 4^{th} instar larvae of cotton leafworm infested cotton plant. Results obtained indicated that ME1 which have the best physico-chemical properties of the spray solution gave the higher insecticidal efficiency.

3-3- The fungicidal efficiency of the locally and commercially formulated Copper oxychloride

The experiment was carried out for the commercially formulated copper oxychloride and the most successfully local formulation against downy mildew fungi infested onion plant. Results obtained indicated that CO18 which have the best physico-chemical properties of the spray solution gave the higher fungicidal efficiency.

3-4- The herbicidal efficiency of the locally and commercially formulated Glyphosate

The experiment was carried out for the commercially formulated glyphosate and the most successfully local formulation (GL5) against perennial narrow leaf weeds infested olive orchard. Results obtained indicated that Round

up and GL5 which have the best physico-chemical properties of the spray solution gave the higher herbicidal efficiency.

4-1- The residues of the locally and commercially formulated chlorpyrifos

The initial deposit and residue of the locally and commercially chlorpyrifos was determined at initial immediately after spraying and after 3, 6, 10, 15 and 17 days of spraying in cotton leaves to show that Helban had the higher initial deposit and residue, followed by CP32.

4-2- The residues of the locally and commercially formulated methomyl

The initial deposit and residue of the locally and commercially formulated methomyl was determined at initial immediately after spraying and after 1, 3, 5 and 7 days of spraying in cotton leaves to show that ME1 had the higher initial deposit and residue.

4-3- The residues of the locally and commercially formulated copper oxychloride

The initial deposit and residue of the locally and commercially formulated copper oxychloride was determined at initial immediately after spraying and after 5, 10, 15 and 20 days of spraying in onion plant to show that CO18 had the higher initial deposit and residue.

4-4- The residues of the locally and commercially formulated glyphosate

The initial deposit and residue of the locally and commercially formulated glyphosate was determined at initial immediately after spraying and after 5, 10 and 15 days of spraying in cotton leaves to show that Round up had the higher initial deposit and residue, followed by GL5.

Generally, this study proved that possibility of using local raw materials and products in preparation the active ingredients of the conventional pesticides as successful formulations according to the world specifications, moreover, the locally prepared formulations had the same or more than the commercial pesticides in their pesticidal efficiency.