CLAIMS

1. A method of extending the effective field life of an insecticide, comprising the steps of:

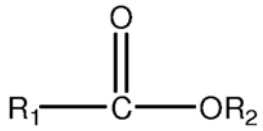
providing at least one insecticide, at least one esterified fatty acid, at least one cross-linking agent and at least one type of monomer;

mixing the insecticide, the esterified fatty acid, the at least one cross-linking agent and at least one type of monomer; and

forming a polymeric microcapsule shell that at least partially encapsulates a portion of the insecticide and a portion of the esterified fatty acid to form a microencapsulated insecticidal formulation,

wherein the insecticide is an organophosphate insecticide selected from the group consisting of acephate, azinphos-methyl, chlorfenvinphos, chlorethoxyfos, chlorpyriphos, diazinon, dimethoate, disulfoton, ethoprophos, fenitrothion, fenthion, fenamiphos, fosthiazate, methamidophos, methidathion, omethoate, oxydemeton-methyl, parathion, parathion-methyl, phorate, phosmet, profenofos and trichlorfon,

and wherein the esterified fatty acid is represented by the formula



in which R_1 is a straight chain or branched alkenyl group having from 11 to 25 carbon atoms, and R_2 is a straight chain or branched alkyl, or alkenyl group having from 1 to 8 carbon atoms. ~~microencapsulated insecticidal formulation retains its ability to control insects for at least 1 week after the formulation is applied to an area adjacent to a population of insects.~~

2. The method according to claim 1, wherein the esterified fatty acid is methyl oleate~~:~~

~~O~~

~~R1 C OR2~~

~~wherein;~~

~~Ri is a straight chain or branched alkyl, or alkenyl group having from 1 1 to 25 carbon atoms, and R2 is a straight chain or branched alkyl, or alkenyl group having from 1 to 8 carbon atoms~~.

3. The method according to claim 1 or 2, wherein the organophosphate insecticide is chlorpyrifos-methyl~~esterified fatty acid is methyl oleate~~.

4. The method according to ~~claim 1~~any one of the preceding claims, wherein the polymer shell is formed by an interfacial polycondensation and the at least one monomer type includes:

at least one oil soluble monomer selected from the group consisting of:

diisocyanates, polyisocyanates, diacid chlorides, poly acid chlorides, sulfonyl chlorides, and chloroformates; and

at least one crosslinking agent selected from the group consisting of diamines, polyamines, water soluble diols and water soluble polyols~~insecticide is an organophosphate insecticide~~.

5. The method according to ~~claim 4~~any one of the preceding claims, wherein the microcapsule shell has a thickness of between 90 nm ± 20 percent to 150 nm ± 20 percent~~organophosphate insecticide is selected from the group consisting of: acephate, azinphos-methyl, chlorfenvinphos, chlorethoxyfos, chlorpyriphos, diazinon, dimethoate, disulfoton, ethoprophos, fenitrothion, fenthion, fenamiphos, fosthiazate, malathion, methamidophos, methidathion, omethoate, oxydemeton-methyl, parathion, parathion-methyl, phorate, phosmet, profenofos, and trichlorfon~~.

6. The method according to ~~claim 4~~any one of the preceding claims, wherein the microcapsule shell has a thickness of 120 nm ± 20 percent~~organophosphate insecticide is chlorpyrifos-methyl~~.

7. The method according to claim 4~~1~~, wherein the crosslinking agent is diethylenetriamine~~polymer shell is formed by an interfacial polycondensation and the at least one monomer type includes: at least one oil soluble monomer selected from the group consisting of: diisocyanates, polyisocyanates, diacid chlorides, poly acid chlorides, sulfonyl chlorides, and chloroformates; and at least one crosslinking agent~~

~~selected from the group consisting of: diamines, polyamines, water soluble diols and water soluble polyols~~.

8. A method for controlling an insect population, comprising the steps of:

providing a microencapsulate insecticide comprising:

at least one esterified fatty acid;

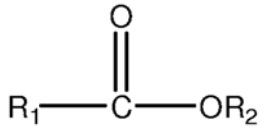
at least one organophosphate insecticide; and

and a polymeric microcapsule shell that at least partially encapsulates the insecticide and the esterified fatty acid; and

applying the microcapsule formulation to an area adjacent to a population of insects,

wherein the organophosphate insecticide is selected from the group consisting of acephate, azinphos-methyl, chlorfenvinphos, chlorethoxyfos, clorpyriphos, diazinon, dimethoate, disulfoton, ethoprophos, fenitrothion, fenthion, fenamiphos, fosthiazate, methamidophos, methidathion, omethoate, oxydemeton-methyl, parathion, parathion-methyl, phorate, phosmet, profenofos and trichlorfon,

and wherein the esterified fatty acid is represented by the formula:



in which R_1 is a straight chain or branched alkenyl group having from 11 to 25 carbon atoms, and R_2 is a straight chain or branched alkyl, or alkenyl group having from 1 to 8 carbon atoms~~The method according to claim 1 , wherein the microcapsule shell has a thickness of between about 90 to about 150 nm~~.

9. The method according to claim 8~~1~~, wherein the organophosphate insecticide is chlorpyrifos-methyl~~microcapsule shell has a thickness of about 120 nm~~.

10. The method according to claim 8 or 9~~7~~, wherein the capsule wall is formed by a interfacial polycondensation between at least one oil soluble monomer selected from the group consisting of diisocyanates, polyisocyanates, diacid chlorides, poly acid chlorides, sulfonyl chlorides, and chloroformates; and at least one water soluble

monomer selected from the group consisting of: diamines, polyamines, water soluble diols and water soluble polyolscross-linking agent is diethylenetriamine.

11. The method according to claim 10, wherein the cross-linking agent is diethylenetriamineA method for controlling an insect population, comprising the steps of: providing a microencapsulate insecticide comprising: at least one esterified fatty acid; at least one organophosphate insecticide; and and a polymeric microcapsule shell that at least partially encapsulates the insecticide and the esterified fatty acid; and applying the microcapsule formulation to an area adjacent to a population of insects, wherein the microencapsulated formulation retains its insecticidal activity for at least 120 days after it is applied to the area adjacent to a population of insects.

12. The method according to any one of claims 8 to 11 1 , wherein the esterified fatty acid is methyl oleateorganophosphate insecticide is selected from the group consisting of: acephate, azinphos-methyl, chlorfenvinphos, chlorethoxyfos, chlorpyriphos, diazinon, dimethoate, disulfoton, ethoprophos, fenitrothion, fenthion, fenamiphos, fosthiazate, malathion, methamidophos, methidathion, omethoate, oxydemeton-methyl, parathion, parathion-methyl, phorate, phosmet, profenofos, and trichlorfon.

13. The method according to any one of claims 8 to 12 1 1, wherein the microcapsule wall has a thickness of between 90 nm ± 20 percent to 150 nm ± 20 percentorganophosphate insecticide is chlorpyrifos-methyl.

14. The method according to any one of claims 8 to 13 1 1, wherein the microcapsule has a thickness of 120 nm ± 20 percentcapsule wall is formed by a interfacial polycondensation between at least one oil soluble monomer selected from the group consisting of: diisocyanates, polyisocyanates, diacid chlorides, poly acid chlorides, sulfonyl chlorides, and chloroformates; and at least one water soluble monomer selected from the group consisting of: diamines, polyamines, water soluble diols and water soluble polyols.

15. A microencapsulated insecticidal formulation, comprising:

chlorpyrifos-methyl;

methyl oleate; and

a microcapsule shell, comprising a polyurea~~The method according to claim 14, wherein the cross-linking agent is diethylenetriamine~~.

~~16. The method according to claim 1 1 , wherein the esterified fatty acid is: A O~~

~~R1 C OR2~~

~~wherein; R1 is a straight chain or branched alkyl, or alkenyl group having from 1 1 to 25 carbon atoms, and~~

~~R2 is a straight chain or branched alkyl, or alkenyl group having from 1 to 8 carbon atoms.~~

~~17. The method according to claim 16, wherein the esterified fatty acid is methyl oleate.~~

~~18. The method according to claim 10, wherein the microcapsule wall has a thickness of between about 90 nm to about 150 nm.~~

~~19. The method according to claim 10, wherein the microcapsule has a thickness of about 120 nm.~~

~~20. A microencapsulated insecticidal formulation, comprising: chlorpyrifos-methyl; methyl oleate; and and a microcapsule shell, comprising a polyurea.~~