CLAIMS

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

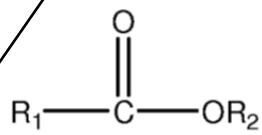
providing at least one insecticide, at least one esterified fatty acid, at least one cross-linking agent and at least one type of monomer;

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.

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

3. The method according to claim 1 or 2, wherein the organophosphate insecticide is chlorpyrifos-methyl.

4. The method according to 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.

5. The method according to any one of the preceding claims, wherein the microcapsule shell has a thickness of between 90 nm ± 20 percent to 150 nm ± 20 percent.

6. The method according to any one of the preceding claims, wherein the microcapsule shell has a thickness of 120 nm ± 20 percent.

7. The method according to claim 4, wherein the crosslinking agent is diethylenetriamine.

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

providing a microencapsulate insecticide comprising:

at least one esterified fatty acid;

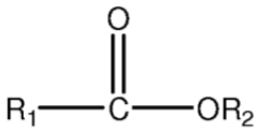
at least one organophosphate insecticide; and

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.

9. The method according to claim 8, wherein the organophosphate insecticide is chlorpyrifos-methyl.

10. The method according to claim 8 or 9, 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 polyols.

11. The method according to claim 10, wherein the cross-linking agent is diethylenetriamine.

12. The method according to any one of claims 8 to 11, wherein the esterified fatty acid is methyl oleate.

13. The method according to any one of claims 8 to 12, wherein the microcapsule wall has a thickness of between 90 nm ± 20 percent to 150 nm ± 20 percent.

14. The method according to any one of claims 8 to 13, wherein the microcapsule has a thickness of 120 nm ± 20 percent.

15. A microencapsulated insecticidal formulation, comprising:

chlorpyrifos-methyl;

methyl oleate; and

a microcapsule shell, comprising a polyurea.

CLAIMS

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

providing at least one organophosphate 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;

forming a polymeric microcapsule shell by interfacial condensation, the polymeric microcapsule shell having a thickness between 90 nm ± 20 percent to 150 nm ± 20 percent 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

wherein the esterified fatty acid is methyl oleate;

wherein the cross-linking agent is selected from diethylenetriamine and ethylenediamine; and

wherein the monomer is selected from the group consisting of: diisocyanates, polyisocyanates, diacid chlorides, poly acid chlorides, sulfonyl chlorides, and chloroformates.

2. The method according to claim 1, wherein the organophosphate insecticide is chlorpyrifos-methyl.

3. The method according to claim 1 or 2, wherein the microcapsule shell has a thickness of 120 nm ± 20 percent.

4. The method according to any one of the preceding claims, wherein the crosslinking agent is diethylenetriamine.

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

providing a microencapsulate insecticide comprising:

at least one esterified fatty acid, wherein the esterified fatty acid is methyl oleate;

at least one organophosphate insecticide; and

and a polymeric microcapsule shell having a thickness of between 90 nm ± 20 percent to 150 nm ± 20 percent that at least partially encapsulates the insecticide and the esterified fatty acid, wherein the polymer shell is formed by an interfacial polycondensation between a 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 diethylenetriamine and ethylenediamine; and

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

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.

6. The method according to claim 5, wherein the organophosphate insecticide is chlorpyrifos-methyl.

7. The method according to claim 5 or claim 6, wherein the cross-linking agent is diethylenetriamine.

8. The method according to any one of claims 5, 6, or 7, wherein the microcapsule shell has a thickness of 120 nm ± 20 percent.

9. A microencapsulated insecticidal formulation, comprising:

chlorpyrifos-methyl;

methyl oleate; and

a microcapsule shell having a thickness of between 90 nm ± 20 percent to 150 nm ± 20 percent, comprising a polyurea.