Claims

1. An agricultural product comprising fertilizer and a polymer mixed with the fertilizer, said polymer being an anionic polymer comprising at least four repeat units distributed along the length of the polymer chain,

said repeat units comprising at least one each of a maleic, itaconic, and sulfonate repeat unit.

2. An agricultural product comprising a polymer in combination with a fertilizer, said polymer being an anionic polymer comprising at least four repeat units distributed along the length of the polymer chain, said at least four repeat units comprising at least one each of type B, type C, and type G repeat units,

said type B repeat units selected from the group consisting of repeat units derived from substituted and unsubstituted monomers of maleic acid and/or anhydride, fumaric acid and/or anhydride, mesaconic acid and/or anhydride, mixtures of the foregoing, and any isomers, esters, acid chlorides, and partial or complete salts of any of the foregoing, wherein type B repeat units may be substituted with one or more C1-C6 straight or branched chain alkyl groups substantially free of ring structures and halo atoms, and wherein the salts have salt-forming cations selected from the group consisting of metals, amines, and mixtures thereof,

said type C repeat units selected from the group consisting of repeat units derived from substituted or unsubstituted monomers of itaconic acid, itaconic anhydride, and any isomers, esters, and the partial or complete salts of any of the foregoing, and mixtures of any of the foregoing, wherein the type C repeat units may be substituted with one or more C1-C6 straight or branched chain alkyl groups substantially free of ring structures and halo atoms, and wherein the salts have salt-forming cations selected from the group consisting of metals, amines, and mixtures thereof,

said type G repeat units selected from the group consisting of repeat units derived from substituted or unsubstituted sulfonated monomers possessing at least one carbon-carbon double bond and at least one sulfonate group and which are substantially free of aromatic rings and amide groups, and any isomers, and the partial or complete salts of any of the foregoing, and mixtures of any of the foregoing, wherein type G repeat units may be substituted with one or more C1-C6 straight or branched chain alkyl groups substantially free of ring structures and halo atoms, and wherein the salts of the type G repeat units have salt-forming cations selected from the group consisting of metals, amines, and mixtures thereof,

said anionic polymer containing no more than about 10 mole percent of non-carboxylate olefins and/or ethers.

3. The agricultural product of claim 1 or 2, said polymer being a tetrapolymer and having maleic and itaconic repeat units, and two different sulfonate repeat units.

4. The agricultural product of any one of claims 1 to 3, said fertilizer being solid fertilizer, said polymer applied to said fertilizer as a liquid dispersion.

5. The agricultural product of any one of claims 1 to 3, said fertilizer being in liquid form, said polymer mixed with said liquid fertilizer.

6. The agricultural product of any one of claims 1 to 5, said fertilizer selected from the group consisting of starter fertilizers, phosphate-based fertilizers, fertilizers containing nitrogen, phosphorus, potassium, calcium, magnesium, boron, zinc, manganese, copper, or molybdenum materials, and compounds selected from the group consisting of gypsum, one or more members of the Kieserite Group, potassium magnesium sulfate, elemental sulfur, and mixtures thereof.

7. The agricultural product of any one of claims 1 to 6, said polymer being present at a level of from about 0.001-20 g per 100 g of said fertilizer.

8. The agricultural product of any one of claims 1 to 7, said polymer being in combination with another anionic polymer including maleic and itaconic repeat units.

9. A method of fertilizing soil comprising the step of applying the agricultural product of any one of claims 1 to 8 to soil.

10. A method comprising the step of applying to plants, the leaves of plants, the seeds of plants, or the earth adjacent plants, an effective amount of a polymer,

said polymer being an anionic polymer comprising at least four repeat units distributed along the length of the polymer chain, said repeat units comprising at least one each of a maleic, itaconic, and sulfonate repeat unit.

11. A method comprising the step of applying to plants, the leaves of plants, the seeds of plants, or the earth adjacent plants, an effective amount of a polymer, said polymer being an anionic polymer comprising at least four repeat units distributed along the length of the polymer chain,

said at least four repeat units comprising at least one each of type B, type C, and type G repeat units,

said type B repeat units selected from the group consisting of repeat units derived from substituted and unsubstituted monomers of maleic acid and/or anhydride, fumaric acid and/or anhydride, mesaconic acid and/or anhydride, mixtures of the foregoing, and any isomers, esters, acid chlorides, and partial or complete salts of any of the foregoing, wherein type B repeat units may be substituted with one or more C1-C6 straight or branched chain alkyl groups substantially free of ring structures and halo atoms, and wherein the salts have salt-forming cations selected from the group consisting of metals, amines, and mixtures thereof,

said type C repeat units selected from the group consisting of repeat units derived from substituted or unsubstituted monomers of itaconic acid, itaconic anhydride, and any isomers, esters, and the partial or complete salts of any of the foregoing, and mixtures of any of the foregoing, wherein the type C repeat units may be substituted with one or more C1-C6 straight or branched chain alkyl groups substantially free of ring structures and halo atoms, and wherein the salts have salt-forming cations selected from the group consisting of metals, amines, and mixtures thereof,

said type G repeat units selected from the group consisting of repeat units derived from substituted or unsubstituted sulfonated monomers possessing at least one carbon-carbon double bond and at least one sulfonate group and which are substantially free of aromatic rings and amide groups, and any isomers, and the partial or complete salts of any of the foregoing, and mixtures of any of the foregoing, wherein type G repeat units may be substituted with one or more C1-C6 straight or branched chain alkyl groups substantially free of ring structures and halo atoms, and wherein the salts of the type G repeat units have salt-forming cations selected from the group consisting of metals, amines, and mixtures thereof,

said anionic polymer containing no more than about 10 mole percent of non-carboxylate olefins and/or ethers.

12. The method of claim 10 or 11, said polymer being a tetrapolymer and having maleic and itaconic repeat units, and two different sulfonate repeat units.

13. The method of any one of claims 10 to 12, further comprising applying to plants, the leaves of plants, the seeds of plants, or the earth adjacent plants, an effective amount of a fertilizer.

14. The method of claim 13, said fertilizer being in liquid form, said polymer mixed with said liquid fertilizer.

15. The method of claim 13, said fertilizer being in solid form, said polymer applied to the surface of the solid fertilizer.

16. The method of any one of claims 13 to 15, said fertilizer selected from the group consisting of phosphate-based fertilizers, fertilizers containing nitrogen, phosphorus, potassium, calcium, magnesium, boron, zinc, manganese, copper, or molybdenum materials, and compound selected from the group consisting of gypsum, one or more members of the Kieserite Group, potassium magnesium sulfate, elemental sulfur, and mixtures thereof.

17. The method of any one of claims 13 to 16, said polymer being present at a level of from about 0.001-20 g per 100 g of said fertilizer.