SUMMARY

[0004a] In one aspect, the present disclosure refers to a granular composition for agricultural use comprising:

a plurality of granulates having at least a first biodegradable coating layer applied over the granulates and a second biodegradable coating layer applied over the first biodegradable coating layer,

wherein the granulates comprise a material selected from the group consisting of seeds, fertilizers, and pesticides,

wherein the first biodegradable coating layer consists essentially of polyhydroxyalkanoates and at least one polymer selected from the group consisting of polycaprolactone, polylactic acid, polybutylene succinate, polybutylene succinate-co-adipate, polyvinyl alcohol, polyvinyl acetate, cellulose esters, polysaccharides, polybutylene adipate co butylene terephthalate, polyglycolic acid, polymaleic acid, and mixtures thereof, wherein the polyhydroxyalkanoates comprise from 70 to 99 mole percent monomer residues of hydroxybutyrates and from 1 to 30 mole percent monomer residues of a different hydroxyalkanoate having from 5 to 22 carbon atoms; and

wherein the second biodegradable coating layer comprises at least one polymer selected from the group consisting of polycaprolactone, polylactic acid, polybutylene succinate, polybutylene succinate-co-adipate, mesolactide, polybutylene adipate-co-terephthalate, polyvinyl alcohol, polyvinyl acetate, cellulose esters, polysaccharides, polyglycolic acid, polymaleic acid and mixtures thereof.

[0004b] In another aspect, the present disclosure refers to a method for controlled release of a granular material, comprising the steps of:

providing a granular composition disclosed herein;

dispersing the granular composition over a plot of soil;

dissolving at least the polyhydroxyalkanoates in the first biodegradable coating layer by exposing the plot of soil, and the granular composition dispersed therein, to moisture,

wherein dissolution of the polyhydroxyalkanoates releases the granulate into the soil.

[0005] The above and other needs are met by a granular composition for agricultural use in accordance with the current disclosure. According to one example, this granular composition is made up of a plurality of granulates having a first biodegradable coating layer

WHAT IS CLAIMED IS

Claim 1. A granular composition for agricultural use comprising:

a plurality of granulates having at least a first biodegradable coating layer applied over the granulates and a second biodegradable coating layer applied over the first biodegradable coating layer,

wherein the granulates comprise a material selected from the group consisting of seeds, fertilizers, and pesticides,

wherein the first biodegradable coating layer consists essentially of polyhydroxyalkanoates and at least one polymer selected from the group consisting of polycaprolactone, polylactic acid, polybutylene succinate, polybutylene succinate-co-adipate, polyvinyl alcohol, polyvinyl acetate, cellulose esters, polysaccharides, polybutylene adipate co butylene terephthalate, polyglycolic acid, polymaleic acid, and mixtures thereof, wherein the polyhydroxyalkanoates comprise from 70 to 99 mole percent monomer residues of hydroxybutyrates and from 1 to 30 mole percent monomer residues of a different hydroxyalkanoate having from 5 to 22 carbon atoms; and

wherein the second biodegradable coating layer comprises at least one polymer selected from the group consisting of polycaprolactone, polylactic acid, polybutylene succinate, polybutylene succinate-co-adipate, mesolactide, polybutylene adipate-co-terephthalate, polyvinyl alcohol, polyvinyl acetate, cellulose esters, polysaccharides, polyglycolic acid, polymaleic acid and mixtures thereof.

Claim 2. The granular composition of Claim 1, wherein the polyhydroxyalkanoates comprise from 70 to 99 mole percent monomer residues of 3-hydroxybutyrate.

Claim 3. The granular composition of Claim 1, wherein the polyhydroxyalkanoates comprise from 1 to 30 mole percent monomer residues of 3-hydroxyhexanoate.

Claim 4. The granular composition of Claim 1, wherein the granulates comprise seeds.

Claim 5. The granular composition of Claim 1, wherein the granulates comprise fertilizer.

Claim 6. The granular composition of Claim 1, wherein the granulates comprise pesticide.

Claim 7. The granular composition of Claim 1, wherein the first biodegradable coating layer comprises polyhydroxyalkanoates having a weight average molecular weight from 50,000 to 2.5 million Daltons.

Claim 8. The granular composition of Claim 1, wherein the polyhydroxyalkanoates further comprise monomer residues of 3-hydroxyvalerate, 4-hydroxyvalerate, and/ or 5-hydroxyvalerate.

Claim 9. The granular composition of Claim 1, wherein the polyhydroxyalkanoates comprise three or more different types of hydroxyalkanoate monomer residues, each having from 5 to 22 carbon atoms.

Claim 10. The granular composition of Claim 1, wherein the granulates have an average particle size, before coating, from 1 mm to 25 mm.

Claim 11. The granular composition of Claim 1, wherein the first biodegradable coating layer further comprises from 5 to 95 weight percent polycaprolactone.

Claim 12. The granular composition of Claim 1, wherein the first biodegradable coating layer comprises less than one weight percent polyurethane.

Claim 13. The granular composition of Claim 1, wherein the first biodegradable coating layer comprises 50 to 95 weight percent polyhydroxyalkanoates and 5 to 50 weight percent of a biodegradable polymer other than polyhydroxyalkanoates and wherein at least the first biodegradable coating layer starts to dissolve after 3 to 21 days exposure to environmental conditions at a temp of -5 to 60 °C and a pH of 2 to 9.

Claim 14. A method for controlled release of a granular material, comprising the steps of:

providing a granular composition according to any of Claims 1-13;

dispersing the granular composition over a plot of soil;

dissolving at least the polyhydroxyalkanoates in the first biodegradable coating layer by exposing the plot of soil, and the granular composition dispersed therein, to moisture,

wherein dissolution of the polyhydroxyalkanoates releases the granulate into the soil.