

Release Agent Composition

Field of the Invention

The present invention relates to release agent compositions and various uses thereof.

Background

Release agents (also referred to as form oils, form releases, demoulding agents and parting agents) are compositions which facilitate the separation of hardened concrete from form work or other materials used to mould the shape of the concrete. Release agents may also be used in other activities, such as the release of asphalt from tools and equipment in asphalt paving and road-building operations, or in releasing fibre glass structures from their moulds.

There are principally two categories of release agents, barrier types (also known as non-reactive) and reactive types (also known as chemically active). Barrier type release agents work by creating a barrier between the formwork and fresh concrete and comprise components such as diesel oil (distillate), home heating oils, paraffin wax and used motor oil. Diesel oil, home heating oils, kerosene and products based thereon are used the most frequently, which is partly due to their wide availability, and make up a large proportion of the release agent composition. However in order to create a sufficient barrier between the form work and the concrete, large amounts of the diesel oil or related products are required. The use of such large quantities of product is not cost efficient or user friendly and where these components are flammable, the use of large volumes of these components often presents a safety hazard. The use of large quantities of release agent on the surface of the formwork may also contribute to the formation of "bug holes" or "blowholes", which are indentations in the surface of the concrete. Staining of the concrete once the form work has been removed may also be observed. Both of these reduce the aesthetic appeal of the finished concrete product.

In addition, the diesel oil, home heating oils and kerosene-based release agents may evaporate quite quickly, such that reapplication of the barrier type release agent is required each time the formwork is used, or if there is a delay in pouring the concrete. A further problem is that kerosene or diesel-based components are volatile organic compounds (VOCs) and their use in applications other than for fuel are highly regulated and also dangerous for the local environment and those directly involved in their use. The typically low viscosity and volatile nature of fuels means airborne particles are common and are a concern to end users. As the release properties offered are modest, it is common for excessive amounts to be used which can often result in contamination around the

immediate work area, on workers' clothes and skin. Another drawback is that the high usage rate of these release agents combined with the volatility of the composition may result in the user of the release agent being exposed to dangerous vapours and fumes. Other components used in release agents of the prior art include volatile aromatics, which may also be detrimental to the health of users.

A release agent composition should provide be capable of providing sufficient release of the concrete from the formwork, where the surface of the final concrete product has the desired aesthetics. The use of release agents in the prior art often leads to unwanted staining or discolouration of the surface of the concrete, which is due to particular components of the release agent composition. The surface of the concrete may also have an undesired layer of concrete dust or similar buildup, which is again due to the use of particular components in known release agent compositions.

Reactive type release agents include a wide variety of compositions and generally include a chemically reactive component that chemically combines with the calcium salts in the fresh cement paste and thereby provide the releasing properties of the release agent.

Release agents are generally applied to form work prior to concrete being poured. They are typically sprayed, but may alternatively be brushed, rolled or swabbed onto the formwork or mould. Once the concrete is then poured and hardened the release agents facilitate the removal of the formwork or mould from the hardened concrete. Since the efficient application of the release agent is desirable, the release agent composition needs to be of a particular viscosity to allow for application and sufficient coverage of the formwork. As the viscosity of the release agent composition relates to the components used and their relative concentrations, the components used and their relative concentrations need to be considered in light of the intended use of the composition. Where the formwork is made of a porous material such as wood, the release agent composition is ideally compatible with these materials and still provides the desired release properties, without unwanted effects such as staining of the formwork or retention of residual concrete on the formwork.

It is desired to provide an alternative release agent composition that is environmentally sensitive, is more economically favourable and also results in less propensity to cause staining and "bug holes" than commonly used form oils and release agents.

Summary of the Invention

In one aspect, the present invention provides a release agent composition comprising:

- i) an ester of a fatty acid;

- ii) a waste vegetable oil; and
- iii) an emulsifier.

According to another aspect, the present invention provides a release agent composition comprising:

- i) an ester of a fatty acid present in an amount of between 10 – 80% by weight;
- ii) a waste vegetable oil present in an amount between 10 – 60% by weight; and
- iii) an emulsifier present in an amount between 0.1 – 10% by weight.

According to another aspect, the present invention provides a release agent composition comprising:

- i) an ester of a fatty acid;
- ii) a distilled tall oil; and
- iii) an emulsifier.

According to another aspect, the present invention provides a release agent composition comprising:

- i) an ester of a fatty acid present in an amount of between 10 – 90% by weight;
- ii) a distilled tall oil present in an amount between 1 – 10% by weight; and
- iii) an emulsifier present in an amount between 0.1 – 10% by weight.

According to another aspect, the present invention provides a use of a release agent composition according to an aforementioned aspect, as a release agent for mouldable compositions.

According to another aspect, the present invention provides a use of a release agent composition according to an aforementioned aspect to aid in the removal of a material from tools, machinery or moulds.

Detailed description of the invention

The present invention relates to release agent compositions that provide an alternative to conventional release agents. Many conventional products are classed as hazardous, are made from non-renewable materials and require dilution via mixing prior to use.

The release agent compositions as herein described are non-toxic, inherently safe to handle and use, do not require mixing or dilution and are made from sustainable materials. The formulation of the release agents may be modified to achieve a wide range of releasing properties. The viscosity of the finished product may also be adjusted to meet the requirements of various application methods, usage conditions and formwork materials.

The present invention relates to a release agent composition that comprises an ester of a fatty acid, a vegetable oil, and an emulsifier. The present invention also relates to a release agent composition that comprises an ester of a fatty acid, a distilled tall oil, and an emulsifier. Without wishing to be bound by theory it has been found that by combining a component having a significant free fatty acid content, such as vegetable oil, acid oil, a vegetable oil fatty acid (such as tall oil fatty acid) and/or distilled tall oil, with an ester of a fatty acid and an emulsifier, a type of hybrid release agent featuring properties of both the barrier and reactive type release agents is formed. When the fatty acids of the composition react with the calcium salts in the surface of the concrete adjacent to the release agent and mould, and form a calcium soap, the desired release properties are provided. The compositions of the release agents as described herein, are dictated by the intended use of the composition. Accordingly, the concentrations of each component are varied with the intended use of the composition.

The viscosity of the release agent compositions is related to the components of the compositions and their relative concentrations and subsequently, the viscosity of the release agent composition can be modified by changing the components used, their relative concentrations, or both. The viscosity of the release agent composition may be determined by the intended use of composition. The viscosity of the release agent composition is of importance, as this affects the manner in which the composition is applied to formwork and the behaviour of the composition once it is applied. For example, if the release agent composition is relatively viscous, it may not be easily sprayed on to formwork and may require application by manual brushing or the like, which may be less efficient. If the release agent composition is not sufficiently viscous, then the composition may not be retained on the formwork and act as a release agent.

The components of the release agent composition and their concentrations also affect the rate of evaporation from the surface to which it is applied and is primarily related to the volatility of the components. Where a release agent composition is too volatile, it will also not be retained on the surface of the formwork and act as a release agent.

One advantage that has been found with the release agent compositions as described herein is partly a result of the lower usage rate of the composition when compared with, for example, diesel oil. The lower usage rate results in reduced potential for "bug hole" formation and staining on the hardened concrete, which is particularly beneficial when architectural concrete finishes are desired.

It was also found that the release agent composition as herein described had a much lower vapour pressure (and hence lower volatility) when compared to any product containing diesel oil, resulting in better longevity due to a much lower level of evaporation. Furthermore, the flash point of the release agent composition is much higher than that of diesel oil (which is about 70 °C) meaning that the release agent compositions are much less dangerous to users of the compositions, when compared to diesel oil or products containing diesel oil.

The term "vegetable oil" as used herein refers to a mixture composed mainly of triglycerides and free acids extracted from a plant. The triglycerides of vegetable oil are typically fatty acid esters of glycerol. The plants from which a vegetable oil is extracted can include, but are not limited to, canola plants, soy plants, oilseed palms, and other plants containing such triglycerides and free acids.

In an embodiment, the vegetable oil present may be virgin material that has been subjected to various levels of processing or refinement. In another embodiment, the vegetable oil may be reclaimed waste oil. In another embodiment, the vegetable oil may be waste vegetable oil (WVO). In another embodiment, the vegetable oil may be a mixture of two or more vegetable oils. In another embodiment, the vegetable oil may be a mixture of virgin vegetable oil and waste vegetable oil.

The term "waste vegetable oil" (WVO) as used herein refers to vegetable oil that has previously been used for industrial or food purposes, such as deep frying. In an embodiment, the waste vegetable oil is collected from food service operations. In another embodiment, the waste vegetable oil is collected from food manufacturing operations. In another embodiment, the waste vegetable oil is collected from other users of vegetable oils. In another embodiment, the waste vegetable oil is a by-product from the refinement of other animal fats or vegetable oils. In an embodiment, the vegetable oil that is refined to give said waste vegetable oil includes (but is not limited to) sunflower oil, hi-oleic sunflower oil, canola oil, hi-oleic canola oil, cottonseed oil, soybean oil and palm oil. Waste vegetable oil typically contains oxidised fatty acids and triglycerides, which result from the use of the vegetable oil in its intended purpose and the subsequent deterioration of these fatty acids

and triglycerides. The use of vegetable oil for frying, subjects the vegetable oil to high temperatures and in the presence of air, which facilitates oxidation and polymerisation of the vegetable oil. The oxidised components of waste vegetable oil may include oxidised fatty acids, which are typically more polar than the unoxidised fatty acids and contribute to the Total Polar Material (TPM) content of the waste vegetable oil. A waste vegetable oil typically has a higher TPM content than virgin vegetable oil. The present inventors have found that the use of a waste vegetable oil in the release agent compositions as disclosed herein provide a composition with better releasing properties, which may be attributed to the higher TPM content of the waste vegetable oil. The use of a waste vegetable oil instead of a virgin vegetable oil reduces the overall cost of the release agent composition and is more environmentally friendly. In an embodiment, the waste vegetable oil is vegetable oil that is oxidised and polymerised as a result of heating at elevated temperatures. In an embodiment, the waste vegetable oil is vegetable oil that has been subjected to deep frying conditions and has been oxidised and polymerised as a result.

In an embodiment, the vegetable oil is present in the release agent composition in an amount between about 10% and about 60% by weight. In another embodiment, the vegetable oil is present in a concentration of about 10% by weight. In another embodiment, the vegetable oil is present in a concentration of about 15% by weight. In another embodiment, the vegetable oil is present in a concentration of about 20% by weight. In another embodiment, the vegetable oil is present in a concentration of about 25% by weight. In another embodiment, the vegetable oil is present in a concentration of about 30% by weight. In another embodiment, the vegetable oil is present in a concentration of about 35% by weight. In another embodiment, the vegetable oil is present in a concentration of about 40% by weight. In another embodiment, the vegetable oil is present in a concentration of about 45% by weight. In another embodiment, the vegetable oil is present in a concentration of about 50% by weight. In another embodiment, the vegetable oil is present in a concentration of about 55% by weight. In an embodiment, the vegetable oil is present in the release agent composition in a range of any two of the listed percentages.

In an embodiment, the vegetable oil present in the composition is a waste vegetable oil. In an embodiment, the waste vegetable oil is present in the release agent composition in an amount between about 10 – 60%. In another embodiment, the waste vegetable oil is present in the release agent composition in an amount of about 10% by weight. In another embodiment, the waste vegetable oil is present in the release agent composition in an amount of about 15% by weight. In another embodiment, the waste vegetable oil is present in the release agent composition in an amount of about 20% by weight. In another

embodiment, the waste vegetable oil is present in the release agent composition in an amount of about 25% by weight. In another embodiment, the waste vegetable oil is present in the release agent composition in an amount of about 30% by weight. In another embodiment, the waste vegetable oil is present in the release agent composition in an amount of about 35% by weight. In another embodiment, the waste vegetable oil is present in the release agent composition in an amount of about 40% by weight. In another embodiment, the waste vegetable oil is present in the release agent composition in an amount of about 45% by weight. In another embodiment, the waste vegetable oil is present in the release agent composition in an amount of about 50% by weight. In another embodiment, the waste vegetable oil is present in the release agent composition in an amount of about 55% by weight. In another embodiment, the waste vegetable oil is present in the release agent composition in a range of any two of the listed percentages.

The term "fatty acid" as used herein refers to a free carboxylic acid with a long aliphatic tail. The long aliphatic tail of the fatty acid may have between 8 and 28 carbon atoms and may be saturated, monounsaturated or polyunsaturated. The acid value of a waste vegetable oil is typically between 5 mg KOH/g and 10 mg KOH/g. In an embodiment, the vegetable oil has an acid value of about 5 mg KOH/g. In another embodiment, the vegetable oil has a free fatty acid concentration of about 10 mg KOH/g. WVO typically has an acid value of about 7 mg KOH/g. It has been found that the acid value of virgin vegetable oil may be lower than that of waste vegetable oil. In an embodiment, the waste vegetable oil has an acid value of about 10 mg KOH/g.

In an embodiment, the composition comprises a vegetable oil as the only fatty acid source. In another embodiment, the composition comprises a vegetable oil and an additional fatty acid source. In another embodiment, the composition comprises a non-vegetable oil as the only fatty acid source. Whether a composition requires an additional fatty acid source is determined by the overall acid value of the vegetable oil and the level of other fatty acid esters in the composition. Accordingly, the present invention provides compositions comprising a vegetable oil and an additional fatty acid source, where the additional fatty acid is added in order to adjust the acid value of the composition to between 1 mg KOH/g and 40 mg KOH/g. In an embodiment, the additional fatty acid has an acid value of between 100 mg KOH/g and 200 mg KOH/g. In another embodiment, the additional fatty acid has an acid value of between about 160 mg KOH/g to 200 mg KOH/g. In an embodiment, the additional fatty acid is derived from vegetable oils such as soybean oil. In another embodiment, the additional fatty acid is a tall oil fraction. In another embodiment, the additional fatty acid is obtained from crude tall oil. In another embodiment, the additional

fatty acid is obtained from tall oil by distillation. In another embodiment, the non-vegetable oil used as the only fatty acid source in the composition is a distilled tall oil.

The term "distilled tall oil" refers to a fraction of tall oil as obtained by distillation with a moderate level of free rosin acids. The term "tall oil fatty acid" refers to a fraction of tall oil as obtained by distillation with a low level of free rosin acids. Although tall oil is derived from a vegetable source, i.e. particular trees, the oil obtained is distinct from vegetable oil, in that it contains rosin acids and has a higher concentration of free fatty acids. The present inventors have found that the releasing properties of the release agent composition are influenced by the overall concentration of the free fatty acids. Where the vegetable oil (or waste vegetable oil) has a low concentration of free fatty acids, a distilled tall oil may be added to the release agent composition, thus increasing the overall free fatty acid concentration and providing the desired release properties. Where a release agent composition comprises a vegetable oil or a waste vegetable oil that has a sufficient concentration of free fatty acids, an additive to increase the concentration of free fatty acids, such as a distilled tall oil, is not required. In an embodiment, the distilled tall oil is present in the release composition in an amount between about 10% and about 60% by weight. In an embodiment, the distilled tall oil is present in the release agent composition in an amount of about 10% by weight. In another embodiment, the distilled tall oil is present in the release agent composition in an amount of about 15% by weight. In another embodiment, the distilled tall oil is present in the release agent composition in an amount of about 20% by weight. In another embodiment, the distilled tall oil is present in the release agent composition in an amount of about 25% by weight. In another embodiment, the distilled tall oil is present in the release agent composition in an amount of about 30% by weight. In another embodiment, the distilled tall oil is present in the release agent composition in an amount of about 35% by weight. In another embodiment, the distilled tall oil is present in the release agent composition in an amount of about 40% by weight. In another embodiment, the distilled tall oil is present in the release agent composition in an amount of about 45% by weight. In another embodiment, the distilled tall oil is present in the release agent composition in an amount of about 50% by weight. In another embodiment, the distilled tall oil is present in the release agent composition in an amount of about 60% by weight. In an embodiment, the release agent composition comprises a distilled tall oil in a range of any two of the listed percentages.

In an embodiment, the release agent composition comprises a vegetable oil and a distilled tall oil. In an embodiment, the release agent composition comprises a waste vegetable oil and a distilled tall oil. In an embodiment, the release agent composition comprises a waste vegetable oil in an amount between 0% and about 60% by weight and a distilled tall oil. In

an embodiment, the release agent composition comprises a waste vegetable oil in an amount of between 0% and about 60% by weight and a distilled tall oil in an amount between about 0% and 10% by weight. In an embodiment, the release agent composition comprises waste vegetable oil in an amount between about 40% and about 60% by weight. In an embodiment, the release agent composition comprises waste vegetable oil in an amount between about 10% and about 30% by weight and distilled tall oil in an amount between about 1% and about 10% by weight.

The term ester of a fatty acid as used herein refers to a condensation product obtained from a long chain fatty acid and a long chain alcohol. The long chain fatty acid may be saturated, monounsaturated or polyunsaturated, with between 6 and 40 carbon atoms. The fatty acid may be completely esterified or partially esterified. The fatty acid esters may be derived from triglycerides. Examples of sources from which the fatty acid esters may be derived include, but are not limited to, fractions derived from canola oil, sunflower oil, cottonseed oil, soybean oil, palm oil or linseed oil. The fatty acid ester may include caprates, caprylates, laurates, myristates, oleates, palmitates, stearates, linolates and linolenates. In an embodiment, the ester of a fatty acid may be an alkyl ester. In another embodiment, the ester of a fatty acid may be a monoalkyl ester. In another embodiment, the ester of a fatty acid may be a short-chain alkyl ester. In another embodiment, the ester of a fatty acid may be a methyl ester. In another embodiment, the ester of a fatty acid may be an ethyl ester. In another embodiment, the ester of a fatty acid may be an isopropyl ester. In an embodiment, the ester of a fatty acid may comprise more than one different ester. In an embodiment, the ester of a fatty acid may be a biodiesel.

The term "biodiesel" as used herein refers to an ester derivative of a vegetable oil or other fat or oil, obtained from the transesterification of the triglycerides in the vegetable oil, fat or oil. In an embodiment, biodiesel may be derived from one or more different sources. In another embodiment, the biodiesel may be derived from a vegetable oil. In an embodiment, the biodiesel may be B100. In an embodiment, the biodiesel may be pure biodiesel. In another embodiment, the biodiesel may be a blend with other components. As biodiesel is derived from sources such as vegetable oils (such as rapeseed oil, soybean oil and waste vegetable oils) and other sources of fats, this component is considered to be derived from a renewable resource and is subsequently better for the environment. The present inventors have found that the use of biodiesel instead of diesel or petrodiesel in release agent compositions can provide a composition that has releasing properties, a property which would typically be provided by the diesel component in known compositions. The ability to replace diesel with a biodiesel provides benefits in relation to cost and reduction in health risks to users and the environment. The present inventors have also found that an ester

that is derived from a waste vegetable oil source, i.e. derived from a transesterification process subjected to a waste vegetable oil, can also be used in the release agent composition to provide the desired release agent properties. In an embodiment, the biodiesel is derived from a vegetable oil. In another embodiment, the biodiesel is derived from a waste vegetable oil.

In an embodiment, the ester of a fatty acid is present in the release agent composition in an amount of between about 10% and about 80% by weight. In an embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 10% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 15% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 20% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 25% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 30% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 35% by weight. In another embodiment, the ester of a fatty acid in the release agent composition is present in an amount of about 40% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 45% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 50% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 55% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 60% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 65% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 70% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 75% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 80% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 85% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 90% by weight. In another embodiment, the ester of a fatty acid is present in the release agent composition in an amount of about 90% by weight. In an embodiment, the release agent composition comprises an ester of a fatty acid in a range of any two of the listed percentages.

In an embodiment, the release agent composition comprises a biodiesel in an amount between about 10% and about 80% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount of about 10% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 15% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 20% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 25% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 30% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 35% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 40% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 45% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 50% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 55% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 60% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 65% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 70% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 75% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 80% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 80% by weight. In another embodiment, the release agent composition comprises a biodiesel in an amount of about 90% by weight. In an embodiment, the release agent composition comprises a biodiesel in a range of any two of the listed percentages.

In an embodiment, the release agent composition comprises a biodiesel. In an embodiment, the release agent composition comprises a vegetable oil and a biodiesel. In an embodiment, the release agent composition comprises a waste vegetable oil and a biodiesel. In an embodiment, the release agent composition comprises a biodiesel and a distilled tall oil. In an embodiment, the release agent composition comprises a waste vegetable oil, a biodiesel and a distilled tall oil. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 10% and about 90% by weight. In an embodiment, the release agent composition comprises a waste vegetable oil in an amount between about 0% and about 90% by weight and a biodiesel in an amount between about 0% and about 60% by weight. In an embodiment, the release agent composition comprises a waste vegetable oil in an amount between about 10% and about 60% by weight and a biodiesel in

an amount between about 10% and about 60% by weight. In an embodiment, the release agent composition comprises a waste vegetable oil between about 10% and about 30% by weight and a biodiesel in an amount between about 10% and about 30% by weight. In an embodiment, the release agent composition comprises a waste vegetable oil between about 40% and about 60% by weight and a biodiesel in an amount between about 30% and about 50% by weight. In an embodiment, the release agent composition comprises a waste vegetable oil between about 10% and about 20% by weight and a biodiesel in an amount between about 70% and about 80% by weight. In an embodiment, the release agent composition comprises a waste vegetable oil in an amount between about 0% and about 60% by weight, a biodiesel in an amount of between 0% and about 60% by weight and a distilled tall oil in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a waste vegetable oil in an amount between about 10% and about 30% by weight, a biodiesel in an amount of between 10% and about 30% by weight and a distilled tall oil in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a waste vegetable oil in an amount between about 10% and about 30% by weight, a biodiesel in an amount of between 10% and about 30% by weight and a distilled tall oil in an amount between about 1% and about 5% by weight. In an embodiment, the release agent composition comprises a waste vegetable oil in an amount between about 10% and about 30% by weight, a biodiesel in an amount of between 10% and about 30% by weight and a distilled tall oil in an amount between about 5% and about 10% by weight.

The term "emulsifier" as used herein refers to a substance that promotes the formation of a stable emulsion by reducing the surface tension between components of a mixture. The term "emulsifier" may also refer to substances known as surfactants or surface-active agents, foaming agents, wetting agents or dispersants. Different emulsifiers may be classified according to their HLB (hydrophilic-lipophilic balance) value, which is a measure of the hydrophilicity or lipophilicity of the emulsifier and provides an indication as to the behaviour of the surfactant. For example, a surfactant with a low HLB value is predominantly hydrophobic and may be known as an antifoaming agent, while a surfactant with a moderate HLB value is less hydrophobic and may be known as a wetting agent. The emulsifier may be a monoester, diester, triester or higher polyester of a fatty acid, inorganic acid or combinations thereof. The fatty acid may be monounsaturated, polyunsaturated or saturated. The ester of an inorganic acid may include phosphate esters, sulfate esters, borate esters and the like. Esters of other molecules such as saccharides or polyols are also included in this definition. These may include esters of glycerol, sorbitol, mannitol, xylitol, pentaerythritol and derivatives thereof. The esterification of the fatty acid, inorganic acid, saccharide or polyol may be complete or partial.

An emulsifier or a surfactant may be described as ionic or non-ionic. A wide range of ionic and non-ionic surfactants may be used for the emulsifier component. Non-ionic surfactants are preferred as they are readily available, of low toxicity and are cost effective. In an embodiment, the emulsifier is glycerol monooleate (GMO). In another embodiment, the emulsifier is sorbitan monooleate (SMO). In another embodiment, the emulsifier is polyglycerol polyricinoleate (PGPR). In another embodiment, the emulsifier is a soy lecithin. In another embodiment, the emulsifier is an ethoxylated sorbitan monooleate. In another embodiment, the emulsifier is polysorbate 81. In another embodiment, the emulsifier is polysorbate 80. In another embodiment, the emulsifier is polysorbate 60. In an embodiment, the emulsifier is a wetting agent. In an embodiment, the wetting agent is sodium bis(2-ethylhexyl)sulfosuccinate, which may also be known as dioctyl sodium sulfosuccinate. The term "wetting agent" as used herein refers to a compound that has properties of an emulsifier, but has different emulsifying properties due to the different nature of the component. The addition of the emulsifier in the release agent composition as herein described also reduces the incidence of "bug holes" which may be caused by immiscibility of the release agent with water, the formation of which are a known problem associated with heavy application of standard release agents.

In an embodiment, the release agent composition comprises a single emulsifier. In another embodiment, the release agent composition comprises more than one emulsifier. The present inventors have found that the use of a combination of emulsifiers may provide the release agent composition with the desired properties. In an embodiment, the release agent composition comprises two emulsifiers. In an embodiment, the release agent composition comprises polyglycerol polyricinoleate and polysorbate 81 as emulsifiers. In another embodiment, the release agent composition comprises polyglycerol polyricinoleate and a wetting agent as emulsifiers. In another embodiment, the release agent composition comprises polyglycerol polyricinoleate and sodium bis(2-ethylhexyl)sulfosuccinate.

In an embodiment, the emulsifier is present in the release agent composition in an amount between about 0.1% and about 10% by weight. In an embodiment, the emulsifier is present in the release agent composition in a concentration of about 2% by weight. In another embodiment, the emulsifier is present in the composition in a concentration of about 3% by weight. In another embodiment, the emulsifier is present in the composition in a concentration of about 4% by weight. In another embodiment, the emulsifier is present in the composition in a concentration of about 5% by weight. In another embodiment, the emulsifier is present in the composition in a concentration of about 6% by weight. In another embodiment, the emulsifier is present in the composition in a concentration of

about 7% by weight. In another embodiment, the emulsifier is present in the composition in a concentration of about 8% by weight. In another embodiment, the emulsifier is present in the composition in a concentration of about 9% by weight. In another embodiment, the emulsifier is present in the composition in a concentration of about 10% by weight. In an embodiment, the release agent composition comprises an emulsifier in a range of any two of the listed percentages.

In an embodiment, the release agent comprises a biodiesel and an emulsifier. In an embodiment, the release agent comprises a biodiesel and one or more emulsifiers. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil and an emulsifier. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil and an emulsifier. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil and an emulsifier. In an embodiment, the release agent comprises a biodiesel and an emulsifier in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 20% and about 80% by weight and an emulsifier in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 40% and about 60% by weight and an emulsifier in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil and an emulsifier in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 20% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight and an emulsifier in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 20% and about 80% by weight, a waste vegetable oil in an amount between about 10% and about 40% by weight and an emulsifier in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 20% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, a waste vegetable oil in an amount between about 10% and about 30% by weight and an emulsifier in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 40% and about 60% by weight, a waste vegetable oil in an amount between about 40% and about 60% by weight and an emulsifier in an amount between about 1% and about 10% by weight.

In an embodiment, the release agent composition comprises a biodiesel and polyglycerol polyricinoleate. In an embodiment, the release agent composition comprises a biodiesel and soy lecithin. In an embodiment, the release agent composition comprises a biodiesel and a sorbitan monooleate. In an embodiment, the release agent comprises a biodiesel, a waste vegetable oil and a sorbitan monooleate. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil and a soy lecithin. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil and polyglycerol polyricinoleate. In an embodiment, the release agent comprises a biodiesel, a waste vegetable oil, a distilled tall oil and polyglycerol polyricinoleate. In an embodiment, the release agent comprises a biodiesel, a waste vegetable oil, a distilled tall oil and a glycerol monooleate. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 40% and about 60% by weight, a waste vegetable oil in an amount between about 40% and about 60% by weight and a sorbitan monooleate in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 60% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight and a polyglycerol polyricinoleate in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 30% and about 40% by weight, a waste vegetable oil in an amount between about 50% and about 60% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight and a glycerol monooleate in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 70% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight and polyglycerol polyricinoleate in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 70% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, polyglycerol polyricinoleate in an amount between about 1% and about 10% by weight and a wetting agent in an amount between about 1% and about 5% by weight.

The release agent compositions disclosed herein may also contain water. In an embodiment, the release agent composition comprises a biodiesel and water. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil and water. In another embodiment, the release agent composition comprises biodiesel, a distilled tall oil, a vegetable oil and water. In another embodiment, the release agent composition comprises biodiesel, a distilled tall oil, a waste vegetable oil and water. The use of water in the release agent composition allows for an aqueous emulsion to be formed, which means that the amounts of the ester of the fatty acid, vegetable oil and any other component present in the

release agent composition may be reduced. In an embodiment, the release agent composition is an emulsion comprising water. In an embodiment, the release agent composition comprises water in an amount between about 40% and about 60% by weight. In an embodiment, the release agent composition comprises water in an amount of about 40% by weight. In another embodiment, the release agent composition comprises water in an amount of about 45% by weight. In another embodiment, the release agent composition comprises water in an amount of about 50% by weight. In another embodiment, the release agent composition comprises water in an amount of about 55% by weight. In another embodiment, the release agent composition comprises water in an amount of about 60% by weight. In an embodiment, the release agent composition comprises water in a range of any two of the listed percentages.

In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, an emulsifier and water. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 10% and about 30% by weight, a waste vegetable oil in an amount between about 10% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight and water in an amount between about 40% and about 50% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 10% and about 30% by weight, a waste vegetable oil in an amount between about 10% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, polyglycerol polyricinoleate in an amount between about 1% and about 10% by weight and water in an amount between about 40% and about 50% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 10% and about 30% by weight, a waste vegetable oil in an amount between about 10% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an polyglycerol polyricinoleate and polysorbate 81 in a combined amount between about 1% and about 10% by weight and water in an amount between about 40% and about 50% by weight.

The release agent composition comprising water may be provided as an emulsion, where the emulsion is provided by combining an emulsifier with the other components of the release agent composition.

The term "anti-oxidant" as used herein refers to an additive of the composition that inhibits oxidation of components of the release agent composition. The anti-oxidant may slow the oxidation of the fatty acids and fatty acid esters by inhibiting the oxidative polymerisation of

unsaturated fatty acids. The anti-oxidant may also inhibit the oxidative cross-linking of unsaturated fatty acids. Classes of anti-oxidant may include electron donors and free radical scavengers. Synthetic anti-oxidant may include the phenolic antioxidants, quinones and esters. Natural anti-oxidants may include extracts from natural sources. Examples of a natural anti-oxidant may include rosmarinic acid and carnosic acid as extracts from rosemary, tocopherols and sterols. In an embodiment, the anti-oxidant is tert-butylhydroquinone (THBQ). In another embodiment, the anti-oxidant is tert-butylhydroxyanisole (BHA). In another embodiment, the anti-oxidant is tert-butylhydroxytoluene (BHT). In another embodiment, the anti-oxidant is propyl gallate. In an embodiment, the anti-oxidant is present in the composition in a concentration of between about 0.01% and about 0.1% by weight. In an embodiment, the anti-oxidant is present in the release agent composition in an amount of about 0.01% by weight. In an embodiment, the anti-oxidant is present in the release agent composition in an amount of about 0.02% by weight. In another embodiment, the anti-oxidant is present in the release agent composition in an amount of about 0.03% by weight. In another embodiment, the anti-oxidant is present in the release agent composition in an amount of about 0.04% by weight. In another embodiment, the anti-oxidant is present in the release agent composition in an amount of about 0.05% by weight. In another embodiment, the anti-oxidant is present in the release agent composition in an amount of about 0.06% by weight. In another embodiment, the anti-oxidant is present in the release agent composition in an amount of about 0.07% by weight. In another embodiment, the anti-oxidant is present in the release agent composition in an amount of about 0.08% by weight. In another embodiment, the anti-oxidant is present in the release agent composition in an amount of about 0.09% by weight. In another embodiment, the anti-oxidant is present in the release agent composition in an amount of about 0.1% by weight. In an embodiment, the release agent composition comprises an antioxidant in a range of any two of the listed percentages.

In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, an emulsifier and an antioxidant. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier and an antioxidant. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier and an antioxidant. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, an emulsifier and an antioxidant. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, an emulsifier, water and an antioxidant.

In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, an emulsifier and an antioxidant in an amount between about 0.01% and about 0.1% by

weight. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier and an antioxidant in an amount between about 0.01% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier and an antioxidant in an amount between about 0.01% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, an emulsifier and an antioxidant in an amount between about 0.01% and about 0.1% by weight.

In an embodiment, the release agent composition comprises a biodiesel in an amount between about 60% and about 80% by weight, a waste vegetable oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight and an antioxidant in an amount between about 0.01% and about 0.1%. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 60% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 5% by weight and an antioxidant in an amount between about 0.01% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 30% and about 40% by weight, a waste vegetable oil in an amount between about 50% and about 60% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight and an antioxidant in an amount between about 0.01% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 20% and about 30% by weight, a waste vegetable oil in an amount between about 20% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight and an antioxidant in an amount between about 0.01% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 20% and about 30% by weight, a waste vegetable oil in an amount between about 20% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight and tert-butylhydroquinone in an amount between about 0.01% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 20% and about 30% by weight, a waste vegetable oil in an amount between about 20% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight, water in an amount between about 40% and about 50% by weight and an antioxidant in an amount between about 0.01% and about 0.05% by weight.

The term "siloxane" as used herein refers to a component with antifoaming properties when used in compositions including vegetable oil as a principle constituent. In the release agent composition as herein described the antifoam component is employed to assist in minimising the incidence of "bug holes" or "blowholes", which are defined as individual, generally rounded, cavities on vertical surfaces of concrete, generally less than 10 mm across. An example of a siloxane suitable for use in the release agent composition as herein described includes polydimethylsiloxane (PDMS).

In an embodiment, the siloxane is present in the composition in a concentration of between about 0.001% and 0.1% by weight. In an embodiment, the siloxane is present in the release agent composition in an amount of about 0.001% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.002% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.003% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.004% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.005% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.006% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.007% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.008% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.009% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.01% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.02% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.03% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.04% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.05% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.06% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.07% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.08% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.08% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.09% by weight. In another embodiment, the siloxane is present in the release agent composition in an amount of about 0.1% by weight. In an embodiment, the

release agent composition comprises a siloxane in a range of any two of the listed percentages.

In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, an emulsifier, an antioxidant and a siloxane. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier, an antioxidant and a siloxane. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier, an antioxidant and a siloxane. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, an emulsifier, an antioxidant and a siloxane. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, an emulsifier, an antioxidant, water and a siloxane. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, an emulsifier, an antioxidant and a siloxane in an amount between about 0.001% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier, an antioxidant and a siloxane in an amount between about 0.001% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier, an antioxidant and a siloxane in an amount between about 0.001% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 40% and about 60% by weight, a waste vegetable oil in an amount between about 40% and about 60% by weight, an emulsifier in an amount between about 1% and about 10% by weight, an antioxidant in an amount between about 0.01% and about 0.05% by weight and a siloxane in an amount between about 0.001% and about 0.005% by weight. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, an emulsifier, an antioxidant and a siloxane in an amount between about 0.001% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 20% and about 30% by weight, a waste vegetable oil in an amount between about 20% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight, an antioxidant in an amount between about 0.01% and about 0.05 % by weight, water in an amount between about 40% and about 50% by weight and a siloxane in an amount between about 0.001% and about 0.005% by weight.

In an embodiment, the release agent composition comprises a biodiesel in an amount between about 40% and about 60% by weight, a waste vegetable oil in an amount between about 40% and about 60% by weight, a sorbitan monooleate in an amount between about 1% and about 10% by weight, tert-butylhydroquinone in an amount between about 0.01%

and about 0.1% by weight and polydimethylsiloxane in an amount between about 0.001% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 60% and about 80% by weight, a waste vegetable oil in an amount between about 10% and about 20% by weight, a sorbitan monooleate in an amount between about 1% and about 10% by weight, tert-butylhydroquinone in an amount between about 0.01% and about 0.1% by weight and polydimethylsiloxane in an amount between about 0.001% and about 0.1% by weight.

In an embodiment, the release agent composition comprises a biodiesel in an amount between about 60% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, polyglycerol polyricinoleate in an amount between about 1% and about 10% by weight, tert-butylhydroquinone in an amount between about 0.01% and about 0.1% by weight and polydimethylsiloxane in an amount between about 0.001% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 40% and about 60% by weight, a waste vegetable oil in an amount between about 40% and about 60% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, glycerol monooleate in an amount between about 1% and about 10% by weight, tert-butylhydroquinone in an amount between about 0.01% and about 0.1% by weight and polydimethylsiloxane in an amount between about 0.001% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 20% and about 30% by weight, a waste vegetable oil in an amount between about 20% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, polyglycerol polyricinoleate in an amount between about 1% and about 10% by weight, tert-butylhydroquinone in an amount between about 0.01% and about 0.1% by weight and polydimethylsiloxane in an amount between about 0.001% and about 0.1% by weight.

The term "corrosion inhibitor" as used herein refers to an additive that prevents the corrosion of the formwork or mould to which the composition is applied. In certain embodiments, the corrosion inhibitor may include one or more amides. The corrosion inhibitor may comprise a mixture of an amine and/or a fatty acid in the presence of the one or more amides. The amine of the corrosion inhibitor may be a polyamine and may include amines such as polyethylene polyamine. An example of a corrosion inhibitor includes Vicamid 2152, as obtained from Vicchem (Victorian Chemical Co. Pty. Ltd).

In an embodiment, the release agent composition comprises a corrosion inhibitor in an amount between about 0.1% and about 0.5% by weight. In an embodiment, the release agent composition comprises a corrosion inhibitor in an amount of about 0.1% by weight. In

another embodiment, the release agent composition comprises a corrosion inhibitor in an amount of about 0.2% by weight. In another embodiment, the release agent composition comprises a corrosion inhibitor in an amount of about 0.3% by weight. In another embodiment, the release agent composition comprises a corrosion inhibitor in an amount of about 0.4% by weight. In another embodiment, the release agent composition comprises a corrosion inhibitor in an amount of about 0.5% by weight. In an embodiment, the release agent composition comprises a corrosion inhibitor in a range of any two of the listed percentages.

In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, an emulsifier, an antioxidant, a siloxane and a corrosion inhibitor. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 30% and about 40% by weight, a waste vegetable oil in an amount between about 50% and about 60% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight, an antioxidant in an amount between about 0.01% and about 0.05% by weight, a siloxane in an amount between about 0.001% and about 0.005% by weight and a corrosion inhibitor in an amount between about 0.1% and about 0.5% by weight.

The term "biocide" as used herein refers to an additive that inhibits the growth of microbes that may lead to the degradation of components in the composition. The microbe may be bacterial in nature. The microbe may be fungal in nature. In an embodiment, the biocide may target bacteria exclusively. In another embodiment, the biocide may target fungi exclusively. In another embodiment, the biocide may target both bacteria and fungi. Where a biocide targets bacteria only, one or more additional biocides targeting other bacteria or fungi may be used in the composition. In an embodiment, the release agent composition comprises a diesel fuel biocide. An example of a biocide includes Diesel Fuel Biocide BC-250, as obtained from Fueltreat Australia Pty Ltd. The present inventors have found that the addition of a biocide to the release agent composition not only reduces the microbial growth in the composition itself, i.e. during periods of storage, but also reduces the microbial activity on the surface of the concrete. Microbial activity on the surface of the concrete may result in the formation of small "pinholes", which may be attributed to respiration of the microbes on the concrete surface. The present inventors have found that the addition of a biocide to the release agent composition serves a dual purpose, whereby the composition itself is protected from microbial degradation and the surface of the concrete is free from pinholes, which provides a more aesthetically pleasing product.

In an embodiment, the biocide is present in the release agent composition in an amount between about 0.02% and 0.1% by weight. In an embodiment, the biocide is present in the release agent composition in an amount of about 0.02% by weight. In another embodiment, the biocide is present in the release agent composition in an amount of about 0.03% by weight. In another embodiment, the biocide is present in the release agent composition in an amount of about 0.04% by weight. In another embodiment, the biocide is present in the release agent composition in an amount of about 0.05% by weight. In another embodiment, the biocide is present in the release agent composition in an amount of about 0.06% by weight. In another embodiment, the biocide is present in the release agent composition in an amount of about 0.07% by weight. In another embodiment, the biocide is present in the release agent composition in an amount of about 0.08% by weight. In another embodiment, the biocide is present in the release agent composition in an amount of about 0.09% by weight. In another embodiment, the biocide is present in the release agent composition in an amount of about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel in a range of any two of the listed percentages.

In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier, an antioxidant, a siloxane and a biocide. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, an emulsifier, an antioxidant, a siloxane and a biocide. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, polyglycerol polyricinoleate and polysorbate 81, tert-butylhydroquinone, polydimethylsiloxane and a biocide. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, polyglycerol polyricinoleate, tert-butylhydroquinone, polydimethylsiloxane and a biocide.

In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil in an amount between about 20% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 5% by weight, polyglycerol polyricinoleate in an amount between about 1% and about 5% by weight, polysorbate 81 in an amount between about 0.1% and about 0.5% by weight, tert-butylhydroquinone in an amount between about 0.01% and about 0.05% by weight, polydimethylsiloxane in an amount between about 0.001% and about 0.005% by weight and a biocide in an amount between about 0.01% and about 0.1% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 70% and about 80% by weight, a distilled tall oil in an amount between about 5% and about 10% by weight, polyglycerol polyricinoleate in an amount between about 1% and about 5% by weight, tert-butylhydroquinone 0.01% and about 0.1% by weight, polydimethylsiloxane in an amount between about 0.001% and

about 0.005% by weight and a biocide in an amount between 0.01% and about 0.1% by weight.

The term "liquid wax ester" as used herein refers to a wax that remains in a liquid state at room temperature. The wax ester is typically an ester derived from long chain fatty acids and long chain alcohols, where the long chain segments are alkyl in nature and mostly unsaturated. Wax esters may be derived from animal sources or vegetable sources, or they may be prepared synthetically. Examples of a wax ester include lanolin oil and jojoba oil. In an embodiment, the release agent composition comprises a liquid wax ester. In an embodiment, the release agent composition comprises lanolin oil as a liquid wax ester. In another embodiment, the release agent composition comprises jojoba oil as a liquid wax ester.

In an embodiment, the liquid wax ester is present in the release agent composition in an amount between about 1% and about 20% by weight. In an embodiment, the liquid wax ester is present in the release agent composition in an amount of about 1% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 2% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 3% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 4% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 5% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 6% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 7% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 8% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 9% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 10% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 11% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 12% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 13% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 14% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 15% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 16% by weight. In another embodiment, the liquid wax ester is present in

the release agent composition in an amount of about 17% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 18% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 19% by weight. In another embodiment, the liquid wax ester is present in the release agent composition in an amount of about 20% by weight. In an embodiment, the release agent composition comprises a liquid wax ester in a range of any two of the listed percentages.

In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil and a liquid wax ester. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier, an antioxidant, a siloxane, a biocide and a liquid wax ester. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, an emulsifier, an antioxidant, a siloxane, a biocide and a liquid wax ester. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier, an antioxidant, a siloxane, a biocide and a lanolin oil. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, an emulsifier, an antioxidant, a siloxane, a biocide and a lanolin oil. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier, an antioxidant, a siloxane, a biocide and a jojoba oil. In an embodiment, the release agent composition comprises a biodiesel, a waste vegetable oil, a distilled tall oil, an emulsifier, an antioxidant, a siloxane, a biocide and a jojoba oil.

In an embodiment, the release agent composition comprises a biodiesel in an amount between about 70% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight and a liquid wax ester in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 70% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight, an antioxidant in an amount between about 0.01% and about 0.1% by weight, a siloxane in an amount between about 0.001% and 0.005% by weight, a biocide in an amount between about 0.1% and about 0.5% by weight and a liquid wax ester in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 10% and about 30% by weight, a waste vegetable oil in an amount between about 10% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight, an antioxidant in an amount between about 0.01% and about 0.1% by weight, a siloxane in an amount between about 0.001% and 0.005% by weight, a biocide in an amount between about 0.1% and about 0.5% by weight and a liquid wax ester in an

amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 10% and about 30% by weight, a waste vegetable oil in an amount between about 10% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight, water in an amount between about 40% and about 60% by weight, an antioxidant in an amount between about 0.01% and about 0.1% by weight, a siloxane in an amount between about 0.001% and 0.005% by weight, a biocide in an amount between about 0.1% and about 0.5% by weight and a liquid wax ester in an amount between about 1% and about 10% by weight.

In an embodiment, the release agent composition comprises a biodiesel in an amount between about 70% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight, an antioxidant in an amount between about 0.01% and about 0.1% by weight, a siloxane in an amount between about 0.001% and 0.005% by weight, a biocide in an amount between about 0.1% and about 0.5% by weight and a lanolin oil in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 10% and about 30% by weight, a waste vegetable oil in an amount between about 10% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight, an antioxidant in an amount between about 0.01% and about 0.1% by weight, a siloxane in an amount between about 0.001% and 0.005% by weight, a biocide in an amount between about 0.1% and about 0.5% by weight and a lanolin oil in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 70% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight, an antioxidant in an amount between about 0.01% and about 0.1% by weight, a siloxane in an amount between about 0.001% and 0.005% by weight, a biocide in an amount between about 0.1% and about 0.5% by weight and a jojoba oil in an amount between about 1% and about 10% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 10% and about 30% by weight, a waste vegetable oil in an amount between about 10% and about 30% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight, an antioxidant in an amount between about 0.01% and about 0.1% by weight, a siloxane in an amount between about 0.001% and 0.005% by weight, a biocide in an amount between

about 0.1% and about 0.5% by weight and a jojoba oil in an amount between about 1% and about 10% by weight.

The overall viscosity of the release agent composition is related to the individual components used and their relative concentrations. Where the viscosity of a particular release agent composition is higher than that desired, a solvent can be added to reduce the viscosity. For example, where the composition comprises a large amount of the ester component, the composition may have a viscosity that is too high for use as a release agent. In such instances, the release agent composition may comprise a solvent in order to reduce the viscosity of the overall composition. As a further example, the use of lanolin oil as a liquid wax ester in the release agent composition may provide a composition with a higher viscosity, such that the use of a solvent as a component of the composition is required in order to provide the desired viscosity.

The term "solvent" as used herein refers to a petroleum-based hydrocarbon liquid that can be mixed in the release agent composition to provide a composition with a lower viscosity. An example of a solvent may include Solvent D60, obtained from Oilchem Pty Ltd. Another example of a solvent may include a Fischer-Tropsch solvent such as GTL Saraline 185V from Shell, which contains very low levels of aromatic components and has a better health, safety and environmental profile. Other solvents that may be suitable for use in a release agent composition include terpene-based solvents, such as those derived from sources such as pine and eucalyptus.

In an embodiment, the release agent composition comprises a solvent in an amount of between about 1% and about 20% by weight. In an embodiment, the release agent composition comprises a solvent in an amount of about 1% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 2% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 3% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 4% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 5% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 6% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 7% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 8% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 9% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 10% by weight. In another embodiment, the release agent composition

comprises a solvent in an amount of about 11% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 11% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 12% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 13% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 14% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 15% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 16% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 17% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 18% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 19% by weight. In another embodiment, the release agent composition comprises a solvent in an amount of about 20% by weight. In an embodiment, the release agent composition comprises a solvent in a range of any two of the listed percentages.

In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier and a solvent. In an embodiment, the release agent composition comprises a biodiesel, a distilled tall oil, an emulsifier, an antioxidant, a siloxane, a biocide, a liquid wax ester and a solvent.

In an embodiment, the release agent composition comprises a biodiesel in an amount between about 70% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, an emulsifier in an amount between about 1% and about 10% by weight, an antioxidant in an amount between about 0.01% and about 0.1% by weight, a siloxane in an amount between about 0.001% and about 0.005% by weight, a biocide in an amount between about 0.01% and about 0.1% by weight, a liquid wax ester in an amount between about 1% and about 10% by weight and a solvent in an amount between about 1% and about 20% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 70% and about 80% by weight, a distilled tall oil in an amount between about 1% and about 10% by weight, polyglycerol polyricinoleate in an amount between about 1% and about 10% by weight, tert-butylhydroquinone in an amount between about 0.01% and about 0.1% by weight, polydimethylsiloxane in an amount between about 0.001% and about 0.005% by weight, a biocide in an amount between about 0.01% and about 0.1% by weight, a lanolin oil in an amount between about 1% and about 10% by weight and a solvent in an amount between about 1% and about 20% by weight. In an embodiment, the release agent composition comprises a biodiesel in an amount between about 70% and about 80% by weight, a

distilled tall oil in an amount between about 1% and about 10% by weight, polyglycerol polyricinoleate and a wetting agent in a combined amount between about 1% and about 10% by weight, tert-butylhydroquinone in an amount between about 0.01% and about 0.1% by weight, polydimethylsiloxane in an amount between about 0.001% and about 0.005% by weight, a biocide in an amount between about 0.01% and about 0.1% by weight, a jojoba oil in an amount between about 1% and about 10% by weight and a solvent in an amount between about 1% and about 20% by weight.

Throughout the specification the aim has been to describe the preferred embodiments of the invention without limiting the invention to any one embodiment or specific collection of features. Those of skill in the art will therefore appreciate that, in light of the instant disclosure, many modifications will be apparent to those skilled in the art without departing from the scope of the present invention.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

The reference in this specification to any prior publication (or information derived from it), or to any matter which is known, is not, and should not be taken as an acknowledgment or admission or any form of suggestion that that prior publication (or information derived from it) or known matter forms part of the common general knowledge in the field of endeavour to which this specification relates.

Examples

The following examples are illustrative of the invention and should not be construed as limiting in any way the general nature of the disclosure of the description throughout this specification.

In each of the examples outlined below the exemplified composition is prepared by (unless stated otherwise) initially combining the vegetable oil and fatty acid components (where present) and biodiesel and mixing the resultant mixture at a speed of approximately 300 rpm. A portion of this mixture is retained and the siloxane and anti-oxidant (where present) were added to the retained portion. The emulsifier is added to the remainder of the vegetable oil/biodiesel mix and the resultant mixture stirred at high shear. The retained portion with the added siloxane and anti-oxidant is combined with the other components slowly while stirring at a similar speed.

Example 1

The table below provides a composition breakdown for a medium viscosity release agent which may be used for releasing concrete from wood form work or other general purpose use. The viscosity of the composition was found to be 12 – 15 cSt @ 40°C.

Raw Material	%
Vegetable oil (WVO)	48%
Biodiesel	47.979%
Sorbitan monooleate	4%
Antioxidant (TBHQ)	0.02%
PDMS	0.001%
TOTAL	100%

Example 2

The table below provides a composition breakdown for a high viscosity release agent which may be used for releasing concrete from metal or plastic materials. The viscosity of the composition was found to be 17 – 21 cSt @ 40°C.

Raw Material	%
Vegetable Oil (WVO)	56%
Biodiesel	31.879%
Distilled tall oil	8%
Glycerol monooleate	4%
Corrosion inhibitor	0.1%
Antioxidant (TBHQ)	0.02%
PDMS	0.001%
TOTAL	100%

Example 3

The table below provides a composition breakdown for a low viscosity release agent which may be used for clay extrusion and in the manufacture of concrete pipes. The viscosity of the composition was found to be 5 – 7 cSt @ 40°C.

Raw Material	%
Biodiesel	85.879%
Distilled tall oil	10%
Polyglycerol polyricinoleate	4%
Corrosion inhibitor	0.1%
Antioxidant (TBHQ)	0.02%
PDMS	0.001%
TOTAL	100%

Example 4

The table below provides composition breakdown for a low viscosity release agent which may be used as a general purpose release agent. The viscosity of the composition was found to be 6 – 8 cSt @ 40°C.

Raw Material	%
Vegetable oil (WVO)	16%
Biodiesel	78.979%
Soy lecithin	5%
Antioxidant (TBHQ)	0.02%
PDMS	0.001%
TOTAL	100%

Example 5 – Composition for a water-based emulsion

The biodiesel, waste vegetable oil, distilled tall oil and polyglycerol polyricinoleate were added to a vessel and mixed together under moderate shear. Water was added and further mixed under moderate shear to form a loose emulsion. The additives were then added with mixing under moderate shear. The composition was then emulsified under high shear to give a stable emulsion.

Raw Material	%
Water	43.869%
Biodiesel	21.00%
Waste Vegetable Oil	21.00%
Distilled tall oil	8.00%
Polyglycerol polyricinoleate	6.00%
Tert-butylhydroquinone	0.03%
PDMS	0.001%
Biocide	0.1%
TOTAL	100.00%

Example 6 – Emulsion with lanolin

The composition described below is designed for use in applications requiring high release properties, such as precasting. The biodiesel, waste vegetable oil, distilled tall oil, polyglycerol polyricinoleate and polysorbate 81 were added to a vessel and mixed together under moderate shear. Water was added and mixed under moderate shear to form an emulsion. Additives were then added while mixing under moderate shear. The composition was then emulsified under high shear to yield a stable emulsion. The lanolin was then blended into the emulsion.

Raw Material	%
Water	44%
Biodiesel	22.4%
Waste Vegetable Oil	22.4%
Distilled tall oil	3.4%
Polyglycerol polyricinoleate	4.00%
Polysorbate 81	0.4%
Lanolin oil	3.4%
Tert-butylhydroquinone	0.004%
PDMS	0.001%
Biocide	0.05%
TOTAL	100.091%

Example 7 – Neat with lanolin

This composition is designed for use in applications where high release properties are required and a neat, low viscosity oil is preferred. The biodiesel, distilled tall oil, polyglycerol polyricinoleate, solvent and lanolin were blended together under moderate shear. The additives were then added to the mixture under moderate shear. A final high shear mixing stage was used to ensure homogeneity of the finished product.

Raw Material	%
Biodiesel	73%
Distilled tall oil	6%
Polyglycerol polyricinoleate	4.00%
Lanolin oil	6%
Wetting agent	1%
Tert-butylhydroquinone	0.07%
PDMS	0.001%
Biocide	0.10%
Solvent	10%
TOTAL	100.171%

Example 8 – Neat with jojoba oil

The biodiesel, distilled tall oil, sorbitan monooleate, solvent and lanolin were blended together under moderate shear. The additives were then added to the mixture under moderate shear. A final high shear mixing stage was used to ensure homogeneity of the finished product. The finished product was found to have a viscosity in the range of 5 – 7 cSt @ 40 °C

Raw Material	%
Biodiesel	83%
Distilled tall oil	6%
Polyglycerol polyricinoleate	4.00%
Jojoba oil	6%
Wetting agent	1%
Tert-butylhydroquinone	0.05%
PDMS	0.001%
Biocide	0.1%
Wetting agent	1%
TOTAL	100.171%

The claims defining the invention are as follows:

1. A release agent composition comprising:
 - i) an ester of a fatty acid;
 - ii) a waste vegetable oil; and
 - iii) an emulsifier.
2. A release agent composition comprising:
 - i) an ester of a fatty acid present in an amount of between 10 – 80% by weight;
 - ii) a waste vegetable oil present in an amount between 10 – 60% by weight; and
 - iii) an emulsifier present in an amount between 0.1 – 10% by weight.
3. A release agent composition according to claim 1 or 2, further comprising a distilled tall oil.
4. A release agent composition according to any one of claims 1 to 3, wherein the composition further comprises a corrosion inhibitor.
5. A release agent composition according to any one of claims 1 to 4, further comprising water.
6. A release agent composition according to any one of claims 1 to 5, wherein the ester of a fatty acid is a biodiesel.
7. A release agent composition according to claim 6, wherein the biodiesel is B100.
8. A release agent composition according to any one of claims 1 to 5, wherein the ester of a fatty acid is a methyl ester of a fatty acid.
9. A release agent composition according to any one of claims 1 to 8, wherein the composition further comprises an antioxidant.
10. A release agent composition according to claim 9, wherein the antioxidant is tert-butylhydroquinone.
11. A release agent composition according to any one of claims 1 to 10, wherein the composition further comprises a siloxane.

12. A release agent composition according to any one of claims 1 to 11, wherein the composition further comprises a biocide.
13. A release agent composition according to any one of claims 1 to 12, wherein the composition further comprises a liquid wax ester.
14. A release agent composition according to claim 13, wherein the liquid wax ester is a lanolin oil or a jojoba oil.
15. A release agent composition according to any one of claims 1 to 14, wherein the composition comprises a further emulsifier.
16. A release agent composition according to any one of claims 1 to 15, wherein the emulsifier is selected from the group consisting of polyglycerol polyricinoleate, sorbitan monooleate, a polysorbate, soy lecithin and glycerol monooleate.
17. Use of a release agent composition according to any one of claims 1 to 16, as a release agent for mouldable compositions.
18. Use according to claim 17, wherein the mouldable composition is selected from the group consisting of concrete, asphalt and fibreglass.
19. Use of a release agent composition according to any one of claims 1 to 16 to aid in the removal of a material from tools, machinery or moulds.
20. Use of claim 19, wherein the material is selected from the group consisting of concrete, asphalt and fibreglass.