extract the pine oil fraction from the pulping process. The pine oil is then processed into fractions, such as synthetic pine oil. NaOH was also used in US Patent 6,759,370 to convert the tall oil in the mix into a soap for the purposes of surfaction.

All references, including any patents or patent applications cited in this specification, are hereby incorporated by reference. No admission is made that any reference constitutes prior art.

SUMMARY

According to a first aspect of the disclosure, there is provided an organic herbicide product comprising:

low lignin content pine oil 48%-80% (w/w);

low to medium rosin tall oil 15%-40% (w/w); and

either KOH 3%-10% (w/w), or KOH and NaOH in a combined amount of 3%-10% (w/w);

wherein the pH of the product is 9 to 11;

wherein the low lignin content pine oil comprises less than 1% (w/v) lignin; and

wherein the low to medium rosin tall oil is a tall oil with 1% (w/w) or less rosin acid or a tall oil with more than 1% (w/w) to 33% (w/w) rosin acid.

According to a first example of the disclosure, there is provided an organic herbicide product comprising:

low lignin content pine oil about 48%-80% (w/w);

low to medium rosin tall oil about 15%-40% (w/w);

KOH about 3%-10% (w/w);

wherein the pH of the product is about 8 to about 12.

According to another example of the disclosure, there is provided an organic herbicide product comprising:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 18%-31% (w/w);

KOH about 3%-8% (w/w);

wherein the pH of the product is about 10 to about 11.

According to another example of the disclosure, there is provided an organic herbicide product comprising:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 19.4%-23% (w/w);

KOH about 4%-8% (w/w);

wherein the pH of the product is about 10 to about 11.

According to another example of the disclosure, there is provided an organic herbicide product comprising:

low lignin content pine oil about 48%-80% (w/w);

low to medium rosin tall oil about 15%-40% (w/w);

KOH and NaOH in a combined amount of about 3%-10% (w/w);

wherein the pH of the product is about 8 to about 12.

In some examples, the low lignin content pine oil is present at 53%-75% (w/w) or 61%-75% (w/w), e.g. 72% (w/w). In some examples, the low lignin content pine oil is present at 53%-72% (w/w) or 61%-72% (w/w). In some examples, the low lignin content

pine oil is present at 61% (w/w). In some examples, the low lignin content pine oil is present at 72% (w/w). In some examples, the low lignin content pine oil is present at 72% (w/w). In some examples, the low lignin content pine oil is present at 75% (w/w).

According to another example of the disclosure, there is provided a method of reducing unwanted vegetation in a soil environment comprising applying to the soil environment an effective amount of the organic herbicide product described above, e.g. by spraying.

Thus, according to another aspect of the disclosure, there is provided a method of reducing unwanted vegetation in a soil environment comprising:

spraying the soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil 48%-80% (w/w);

low to medium rosin tall oil 15%-40% (w/w);

either KOH 3%-10% (w/w), or KOH and NaOH in a combined amount of 3%-10% (w/w);

wherein the pH of the product is 9 to 11;

wherein the low lignin content pine oil comprises less than 1% (w/v) lignin; and

wherein the low to medium rosin tall oil is a tall oil with 1% (w/w) or less rosin acid or a tall oil with more than 1% (w/w) to 33% (w/w) rosin acid.

According to another example of the disclosure, there is provided a method of reducing unwanted vegetation in a soil environment comprising:

spraying the soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil about 48%-80% (w/w);

low to medium rosin tall oil about 15%-40% (w/w);

KOH about 3%-10% (w/w);

wherein the pH of the product is about 8 to about 12.

According to another example of the disclosure, there is provided a method of reducing unwanted vegetation in a soil environment comprising:

spraying the soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 18%-31% (w/w);

KOH about 3%-8% (w/w);

wherein the pH of the product is about 10 to about 11.

According to another example of the disclosure, there is provided a method of reducing unwanted vegetation in a soil environment comprising:

spraying the soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 19.4%-23% (w/w);

KOH about 4%-8% (w/w);

wherein the pH of the product is about 10 to about 11.

According to another example of the disclosure, there is provided a method of reducing unwanted vegetation in a soil environment comprising:

spraying the soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil about 48%-80% (w/w);

low to medium rosin tall oil about 15%-40% (w/w);

KOH and NaOH in a combined amount of about 3%-10% (w/w);

wherein the pH of the product is about 8 to about 12.

According to another example of the disclosure, there is provided a method for reducing seed viability comprising applying to a soil environment an effective amount of the organic herbicide product described above, e.g. by spraying.

Thus, according to another aspect of the disclosure, there is provided a method for reducing seed viability comprising:

spraying a soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil 48%-80% (w/w);

low to medium rosin tall oil 15%-40% (w/w);

either KOH 3%-10% (w/w), or KOH and NaOH in a combined amount of 3%-10% (w/w);

wherein the pH of the product is 9 to 11;

wherein the low lignin content pine oil comprises less than 1% (w/v) lignin; and

wherein the low to medium rosin tall oil is a tall oil with 1% (w/w) or less rosin acid or a tall oil with more than 1% (w/w) to 33% (w/w) rosin acid.

According to another example of the disclosure, there is provided a method for reducing seed viability comprising:

spraying a soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil about 48%-80% (w/w);

low to medium rosin tall oil about 15%-40% (w/w);

KOH about 3%-10% (w/w);

wherein the pH of the product is about 8 to about 12.

According to another example of the disclosure, there is provided a method for reducing seed viability comprising:

spraying a soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 18%-31% (w/w);

KOH about 3%-8% (w/w);

wherein the pH of the product is about 10 to about 11.

According to another example of the disclosure, there is provided a method for reducing seed viability comprising:

spraying a soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 19.4%-23% (w/w);

KOH about 4%-8% (w/w);

wherein the pH of the product is about 10 to about 11.

According to another example of the disclosure, there is provided a method for reducing seed viability comprising:

spraying a soil example with an effective amount of an organic herbicide product comprising:

low lignin content pine oil about 48%-80% (w/w);

low to medium rosin tall oil about 15%-40% (w/w);

KOH and NaOH in a combined amount of about 3%-10% (w/w);

wherein the pH of the product is about 8 to about 12.

In some examples, the organic herbicide product damages the shell casing of the seed, thereby exposing the interior of the seed to the elements.

In some examples, the seed is present in the soil environment and/or is present on unwanted vegetation growing within the soil environment.

According to another example of the disclosure, there is provided a process for preparing an organic herbicide product as described herein, the process comprising mixing at ambient temperature for a time sufficient to cause saponification:

low lignin content pine oil about 48%-80% (w/w);

low to medium rosin tall oil about 15%-40% (w/w);

KOH about 3%-10% (w/w);

wherein the pH of the product is about 8 to about 12.

According to another aspect of the disclosure, there is provided a process for preparing an organic herbicide product, the process comprising mixing at ambient temperature for a time sufficient to cause saponification:

low lignin content pine oil 48%-80% (w/w);

low to medium rosin tall oil 15%-40% (w/w);

KOH about 3%-10% (w/w);

wherein the pH of the product is 9 to 11;

wherein the low lignin content pine oil comprises less than 1% (w/v) lignin; and

wherein the low to medium rosin tall oil is a tall oil with 1% (w/w) or less rosin acid or a tall oil with more than 1% (w/w) to 33% (w/w) rosin acid.

According to another example of the disclosure, there is provided a process for preparing the organic herbicide product described above, the process comprising mixing at ambient temperature for a time sufficient to cause saponification:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 18%-31% (w/w);

KOH about 3%-8% (w/w);

wherein the pH of the product is about 10 to about 11.

According to another example of the disclosure, there is provided a process for preparing an organic herbicide product as described herein, the process comprising mixing at ambient temperature for a time sufficient to cause saponification:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 19.4%-23% (w/w);

KOH about 4%-8% (w/w);

wherein the pH of the product is about 10 to about 11.

According to another aspect of the disclosure, there is provided a process for preparing an organic herbicide product, the process comprising mixing at ambient temperature for a time sufficient to cause saponification:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 19.4%-23% (w/w);

KOH 3.64%-8.8% (w/w);

wherein the pH of the product is 9 to 11;

wherein the low lignin content pine oil comprises less than 1% (w/v) lignin; and

wherein the low to medium rosin tall oil is a tall oil with 1% (w/w) or less rosin acid or a tall oil with more than 1% (w/w) to 33% (w/w) rosin acid.

According to another example of the disclosure, there is provided a process for preparing an organic herbicide product as described herein, the process comprising mixing at ambient temperature for a time sufficient to cause saponification:

low lignin content pine oil about 48%-80% (w/w);

low to medium rosin tall oil about 15%-40% (w/w);

KOH and NaOH in a combined amount of about 3%-10% (w/w);

wherein the pH of the product is about 8 to about 12.

According to another aspect of the disclosure, there is provided a process for preparing an organic herbicide product, the process comprising mixing at ambient temperature for a time sufficient to cause saponification:

low lignin content pine oil 48%-80% (w/w);

low to medium rosin tall oil 15%-40% (w/w);

KOH and NaOH in a combined amount of 3%-10% (w/w);

wherein the pH of the product is 9 to 11;

wherein the low lignin content pine oil comprises less than 1% (w/v) lignin; and

wherein the low to medium rosin tall oil is a tall oil with 1% (w/w) or less rosin acid or a tall oil with more than 1% (w/w) to 33% (w/w) rosin acid.

Thus, the present disclosure provides the following items 1 to 40:

1. An organic herbicide product comprising:
   low lignin content pine oil about 48%-80% (w/w);
   low to medium rosin tall oil about 15%-40% (w/w); and
   either KOH about 3%-10% (w/w), or KOH and NaOH in a combined amount of about 3%-10% (w/w);
   wherein the pH of the product is about 8 to about 12.
2. The organic herbicide product according to item 1, comprising:
   low lignin content pine oil 48%-75% (w/w);
   low to medium rosin tall oil 19.4%-23% (w/w);
   KOH about 4%-8% (w/w);
   wherein the pH of the product is about 10 to about 11.
3. The organic herbicide product according to item 1 or 2, wherein the low lignin content pine oil comprises (% w/w):

3-carene	1.3% – 2.0%;
Limonene	6.0% - 7.20%;
Eucalyptol	0.08% - 0.90%;

g terpinene	1.00% - 1.55%;
limonene isomer	10.90% - 11.10%;
fenchol	1.00% – 1.70%;
b terpinenol	4.40% - 5.50%;
g terpinenol	3.00% - 3.10%;
endo borneol	1.50% – 2.30%;
terpinen-4-ol	1.80% - 2.10%;
alpha-terpinenol	48.0% - 54.9%; and
2-carene	9.00% - 9.35%.

4. The organic herbicide product according to any one of items 1-3, wherein the low lignin content pine oil is hand-tapped pine oil or synthetic pine oil.

CLAIMS

1. An organic herbicide product comprising:

low lignin content pine oil 48%-80% (w/w);

low to medium rosin tall oil 15%-40% (w/w); and

either KOH 3%-10% (w/w), or KOH and NaOH in a combined amount of 3%-10% (w/w);

wherein the pH of the product is 9 to 11;

wherein the low lignin content pine oil comprises less than 1% (w/v) lignin; and

wherein the low to medium rosin tall oil is a tall oil with 1% (w/w) or less rosin acid or a tall oil with more than 1% (w/w) to 33% (w/w) rosin acid.

2. The organic herbicide product according to claim 1, comprising:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 19.4%-23% (w/w);

KOH 3.6%-8.8% (w/w);

wherein the pH of the product is 9 to 11.

3. The organic herbicide product according to claim 1 or 2, wherein the low lignin content pine oil comprises (% w/w):

3-carene	1.3% – 2.0%;
Limonene	6.0% - 7.20%;
Eucalyptol	0.08% - 0.90%;
g terpinene	1.00% - 1.55%;
limonene isomer	10.90% - 11.10%;
fenchol	1.00% – 1.70%;
b terpinenol	4.40% - 5.50%;
g terpinenol	3.00% - 3.10%;
endo borneol	1.50% – 2.30%;
terpinen-4-ol	1.80% - 2.10%;
alpha-terpinenol	48.0% - 54.9%; and
2-carene	9.00% - 9.35%.

4. The organic herbicide product according to any one of claims 1-3, wherein the low lignin content pine oil is hand-tapped pine oil or synthetic pine oil.

5. The organic herbicide product according to any one of claims 1-4, wherein the low lignin content pine oil comprises less than 0.5% (w/v) lignin.

6. The organic herbicide product according to any one of claims 1-5, wherein the product is substantially free of NaOH.

7. The organic herbicide product according to any one of claims 1-6, wherein the low lignin content pine oil is 53-68% (w/v) of the organic herbicide product, or wherein the low lignin content pine oil is 61-68% (w/v) of the organic herbicide product.

8. A method of reducing unwanted vegetation in a soil environment comprising:

spraying the soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil 48%-80% (w/w);

low to medium rosin tall oil 15%-40% (w/w);

either KOH 3%-10% (w/w), or KOH and NaOH in a combined amount of 3%-10% (w/w);

wherein the pH of the product is 9 to 11;

wherein the low lignin content pine oil comprises less than 1% (w/v) lignin; and

wherein the low to medium rosin tall oil is a tall oil with 1% (w/w) or less rosin acid or a tall oil with more than 1% (w/w) to 33% (w/w) rosin acid.

9. The method according to claim 8, comprising:

spraying the soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 19.4%-23% (w/w);

KOH 3.6%-8.8% (w/w);

wherein the pH of the product is 9 to 11.

10. The method according to claim 8 or 9, wherein the low lignin content pine oil comprises (% w/w):

3-carene	1.3% – 2.0%;
Limonene	6.0% - 7.20%;
Eucalyptol	0.08% - 0.90%;
g terpinene	1.00% - 1.55%;
limonene isomer	10.90% - 11.10%;

fenchol	1.00% – 1.70%;
b terpinenol	4.40% - 5.50%;
g terpinenol	3.00% - 3.10%;
endo borneol	1.50% – 2.30%;
terpinen-4-ol	1.80% - 2.10%;
alpha-terpinenol	48.0% - 54.9%; and
2-carene	9.00% - 9.35%.

11. The method according to any one of claims 8-10, wherein the low lignin content pine oil is hand-tapped pine oil or synthetic pine oil.

12. The method according to any one of claims 8-11, wherein the low lignin content pine oil comprises less than 0.5% (w/v) lignin.

13. The method according to any one of claims 8-12, wherein the organic herbicide product is substantially free of NaOH.

14. The method according to any one of claims 8-13, wherein the low lignin content pine oil is at 53-68% (w/v) of the organic herbicide product, or wherein the low lignin content pine oil is at 61-68% (w/v) of the organic herbicide product.

15. The method according to any one of claims 8-14, wherein the unwanted vegetation is annual ryegrass (*Lolium rigidum*), red-root amaranth (*Amaranthus retroflexus*), fat hen (*Chenopodium album*), or blackberry nightshade (*Solanum nigrum*).

16. A method for reducing seed viability comprising:

spraying a soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil 48%-80% (w/w);

low to medium rosin tall oil 15%-40% (w/w);

either KOH 3%-10% (w/w), or KOH and NaOH in a combined amount of 3%-10% (w/w);

wherein the pH of the product is 9 to 11;

wherein the low lignin content pine oil comprises less than 1% (w/v) lignin; and

wherein the low to medium rosin tall oil is a tall oil with 1% (w/w) or less rosin acid or a tall oil with more than 1% (w/w) to 33% (w/w) rosin acid.

17. The method according to claim 16, comprising:

spraying a soil environment with an effective amount of an organic herbicide product comprising:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 19.4%-23% (w/w); and

KOH 3.6%-8.8% (w/w);

wherein the pH of the product is 9 to 11.

18. The method according to claim 16 or 17, wherein the organic herbicide product damages the shell casing of the seed, thereby exposing the interior of the seed to the elements.

19. The method according to any one of claims 16-18, wherein the seed is present in the soil environment and/or is present on unwanted vegetation growing within the soil environment.

20. The method according to any one of claims 16-19, wherein the low lignin content pine oil comprises (% w/w):

3-carene	1.3% – 2.0%
Limonene	6.0% - 7.20
Eucalyptol	0.08% - 0.90%
g terpinene	1.00% - 1.55%
limonene isomer	10.90% - 11.10%
fenchol	1.00% – 1.70%
b terpinenol	4.40% - 5.50%
g terpinenol	3.00% - 3.10%
endo borneol	1.50% – 2.30%
terpinen-4-ol	1.80% - 2.10%
alpha-terpinenol	48.0% - 54.9%; and
2-carene	9.00% - 9,35%.

21. The method according to any one of claims 16-20, wherein the low lignin content pine oil is hand-tapped pine oil or synthetic pine oil.

22. The method according to any one of claims 16-21, wherein the low lignin content pine oil comprises less than 0.5% (w/v) lignin.

23. The method according to any one of claims 16-22, wherein the organic herbicide product is substantially free of NaOH.

24. The method according to any one of claims 16-23, wherein the low lignin content pine oil is at 53-68% (w/v) of the organic herbicide product, or wherein the low lignin content pine oil is at 61-68% (w/v) of the organic herbicide product.

25. The method according to any one of claims 16-24, for reducing the seed viability for seeds of annual ryegrass (*Lolium rigidum*), red-root amaranth (*Amaranthus retroflexus*), fat hen (*Chenopodium album*), or blackberry nightshade (*Solanum nigrum*).

26. The method according to any one of claims 8 to 25, wherein the organic herbicide product is in the form of a concentrate which is mixed or diluted with water, and optionally in the form of an emulsion-in-water.

27. A process for preparing an organic herbicide product, the process comprising mixing at ambient temperature for a time sufficient to cause saponification:

low lignin content pine oil 48%-80% (w/w);

low to medium rosin tall oil 15%-40% (w/w);

KOH 3%-10% (w/w);

wherein the pH of the product is 9 to 11;

wherein the low lignin content pine oil comprises less than 1% (w/v) lignin; and

wherein the low to medium rosin tall oil is a tall oil with 1% (w/w) or less rosin acid or a tall oil with more than 1% (w/w) to 33% (w/w) rosin acid.

28. A process for preparing an organic herbicide product, the process comprising mixing at ambient temperature for a time sufficient to cause saponification:

low lignin content pine oil 48%-75% (w/w);

low to medium rosin tall oil 19.4%-23% (w/w);

KOH 3.6%-8.8% (w/w);

wherein the pH of the product is 9 to 11;

wherein the low lignin content pine oil comprises less than 1% (w/v) lignin; and

wherein the low to medium rosin tall oil is a tall oil with 1% (w/w) or less rosin acid or a tall oil with more than 1% (w/w) to 33% (w/w) rosin acid.

29. A process for preparing an organic herbicide product, the process comprising mixing at ambient temperature for a time sufficient to cause saponification:

low lignin content pine oil 48%-80% (w/w);

low to medium rosin tall oil 15%-40% (w/w);

KOH and NaOH in a combined amount of 3%-10% (w/w);

wherein the pH of the product is 9 to 11;

wherein the low lignin content pine oil comprises less than 1% (w/v) lignin; and

wherein the low to medium rosin tall oil is a tall oil with 1% (w/w) or less rosin acid or a tall oil with more than 1% (w/w) to 33% (w/w) rosin acid.

30. The process according to any one of claims 27-29, wherein the mixing is conducted at a temperature of from 10°C to 35°C.

31. The process according to any one of claims 27-30, wherein the mixing is conducted for 1 to 5 hours.

32. The process according to any one of claims 27-31, wherein the low lignin content pine oil comprises (% w/w):

3-carene	1.3% – 2.0%;
Limonene	6.0% - 7.20%;
Eucalyptol	0.08% - 0.90%;
g terpinene	1.00% - 1.55%;
limonene isomer	10.90% - 11.10%;
fenchol	1.00% – 1.70%;
b terpinenol	4.40% - 5.50%;
g terpinenol	3.00% - 3.10%;
endo borneol	1.50% – 2.30%;
terpinen-4-ol	1.80% - 2.10%;
alpha-terpinenol	48.0% - 54.9%; and
2-carene	9.00% - 9.35%.

33. The process according to any one of claims 27-32, wherein the low lignin content pine oil is hand-tapped pine oil or synthetic pine oil.

34. The process according to any one of claims 27-33, wherein the low lignin content pine oil comprises less than 0.5% (w/v) lignin.

35. The process according to any one of claims 27-34, wherein the product is substantially free of NaOH.

36. The process according to any one of claims 27-35, wherein the low lignin content pine oil is 53-68% (w/v) of the organic herbicide product, or wherein the low lignin content pine oil is 61-68% (w/v) of the organic herbicide product.