23224/88

Commonwealth of Australia
The Patents Act 1952
DECLARATION IN SUPPORT

In support of the (Convention) Application made by: BATTELLE MEMORIAL INSTITUTE, a Corporation organised under the laws of the State of Ohio, U.S.A., of 505 King Avenue, Columbus, Ohio 43201-2693, UNITED STATES OF AMERICA

for a patent for an invention entitled: "ROOT-GROWTH-INHIBITING SHEET"

I (~~We~~) David Charles Evans

of and care of the applicant company do solemnly and sincerely declare as follows:

---

a) ~~I am (We are) the applicant(s) for the patent~~

or

b) I am (~~We are~~) authorised by the applicant(~~s~~) for the patent to make this declaration on its behalf.

Delete the following if not a Convention Application.

The basic application(~~s~~) as defined by section 141 (1~~42~~) of the Act was (~~were~~) made

in UNITED STATES OF AMERICA on 18 August 1987

~~in~~ ~~on~~

~~in~~ ~~on~~

by Frederick G. Burton; Dominic A. Cataldo, John F. Cline; W. Eugene Skiens; Peter Van Voris

The basic application(~~s~~) referred to in this paragraph is (~~are~~) the first application(~~s~~) made in a Convention country in respect of the invention the subject of the application.

---

a) ~~I am (We are) the actual inventor(s) of the invention~~.

or

b) See attached list

~~is~~ (are) the actual inventor(s) of the invention and the facts upon which the applicant company is (~~are~~) entitled to make the application are as follows:

The applicant is the assignee of the invention from the said actual inventors

---

Declared at London, U.K. this 29th day of January 19 90

Signed [signature] Status By Power of Attorney

Declarant's Name DAVID CHARLES EVANS

F. B. RICE & CO PATENT ATTORNEYS

This form is suitable for any type of Patent Application. No legalisation required.

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ROOT-GROWTH-INHIBITING SHEET

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(56) Prior Art Documents
US 3891423

(57) Claim

1. A material for preventing the entry of roots into unwanted areas comprising a sheet of water-permeable material;

characterised in that the sheet material carries distributed bodies of a polymer blended with from 2 to 30 percent of a 2,6-dinitroaniline; wherein the dinitroaniline is released slowly from the distributed bodies by diffusion from the polymer into the soil juxtaposed the material, thereby to prevent elongation or penetration of the roots into the soil around the material.

2. A material as defined in claim 1 wherein said dinitroaniline is trifluralin.

4. A material as defined in any preceding claim wherein said sheet is formed of a non-biodegradable composition.

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(54) Title: ROOT-GROWTH-INHIBITING SHEET

(57) Abstract

A sheet material (2) is disclosed which can be buried in the soil to prevent the entry of roots into unwanted regions. The sheet is a water-permeable material which holds a plurality of polymer bodies (4) containing an effective ingredient of 2,6-dinitroaniline. The effective ingredient slowly diffuses from the polymer into the soil adjacent the sheet material to prevent the root growth over time.

ROOT-GROWTH-INHIBITING SHEET

Introduction

U.S. Patent applications Serial Number 555,113 filed November 23, 1983 and Serial Numbers 314,809 and 314,810, both filed October 26, 1981 disclose method and articles for the inhibition of root growth, particularly the exclusion of the roots from areas in which they are undesirable, e.g., waste burial sites, underground pipelines, basements, sidewalks, or simply the boundaries between adjacent properties. The articles are formed of polymers, e.g., polyethylene, contain in admixture dinitroanilines, preferably N,N-di-n-propyl-4 trifluoromethyl 2,6-dinitroaniline having the generic name trifluralin. Among the articles which are disclosed are pellets of cylindrical form, about 9 mm in diameter and the same in length. These pellets are preferably distributed about 1 or 2 inches apart over the area which it is desired to protect. These pellets containing about 25 percent by weight of trifluralin have proven very satisfactory in use and have been shown by tests to have a probable effective life of 50 to over 100 years. Their disadvantage lies in the fact that to distribute them uniformly is a slow, laborious operation.

Summary of the Invention

In accordance with this invention, a porous sheet material is provided at intervals with bodies of a polymer which contain a 2,6-dinitroaniline. The sheet material is made porous to permit free passage of water. It may be either a perforated sheet or a woven or nonwoven textile material. A particularly desirable embodiment is a nonwoven fabric of non-biodegradable material. This type of material is known as a "geotextile" and is used for weed control,

prevention of erosion on slopes, and other landscaping purposes. In order to obtain a root repelling property, a dinitroaniline is blended with a polymer which is attached to the geotextile or other porous material.

The polymer containing the root repellent dinitroaniline may be distributed in various forms, e.g., as buttons or as, continuous other elongated beads. The choice of the specific mode of distribution depends to a large part on the life desired for the root repellency.

The effectiveness of the porous sheet barrier in inhibiting root elongation is controlled by the soil concentration of dinitroaniline adjacent to the barrier. This is regulated by the release rate of the dinitroaniline from the buttons, or beads. For buttons, spacing is generally on 1- to 2-inch centers. Elongated beads are arranged in regular patterns or spacing to produce a protective soil area. The dinitroaniline will slowly diffuse from the polymer with which it is mixed at a controlled rate, be absorbed to the soil adjacent to the barrier, and thus prevent further elongation or penetration of the roots.

Brief Description of the Drawings

In the drawings Figure 1 is a perspective view of the embodiment employing small buttons of polymer. Figure 2 is a cross section on the line 2-2 of Figure 1. Figure 3 is a plan view of the type employing continuous beads. Figure 4 is a section on the line 4-4 of Figure 3.

Detailed Description

In Figure 1 we have shown a sheet of nonwoven fabric formed of felted fibers of polyethylene or other thermoplastic material. Attached to it are buttons

of polymer in which is mixed from 2 to 30 dinitroaniline, preferably trifluralin. Carbon black is usually added to improve retention of the dinitroaniline. The buttons may be made from a polymer selected from the following list:

Polyethylenes (low density, linear low density, high density)
Polypropylene
Copolymers and blends of above polymers
Ethylene vinylacetate/ethylene acrylic acid/ethylene ethyl acrylate
Polybutylene
Acrylate-styrene-acrylonitrile
Epoxies
Polyamides
Polyesters (aromatic)
Polyurethanes
Silicones

Thermoplastic elastomers which may be prepared from a number of monomers such as styrene block copolymers with butadiene or isoprene, polyether-esters or olefinics.

The buttons, 4, are attached to the sheet, 2, by e.g., adhesives or mechanical fasteners. A particularly desirable mode is by extrusion of a molten plastic mixed with the dinitroaniline onto or through the fabric and allowing it to cool in place. Desirably the buttons have an average diameter of 1/4 to 3/8 inch and an average thickness of 1/8 to 3/8 inch and spaced on 1 to 3 inch centers, preferably not more than 2 inches. As stated above, they should contain from 2 to 30 percent dinitroaniline. Based on experimental results, buttons of the 3/8-inch diameter and 3/8-inch thickness containing 25 percent trifluralin and 25 percent carbon black will have an effective root repelling lifetime of at least 50 years and probably 100 years. Buttons of other sizes

made of different polymers and/or containing different dinitroanilines will have different lives which may be varied according to the intended use. As may be expected, the use of smaller buttons and the use of smaller proportions of dinitroaniline will result in shorter lives, as will the use of dinitroanilines which diffuse more rapidly than trifluralin.

While we have shown the buttons arranged in right angled rows, other distributions, e.g., in a diamond pattern, may be preferred in some cases.

In Figures 3 and 4 we show the use of elongated beads, 8, attached to the fabric 6. These beads may be formed of the same materials and attached in the same manner as the buttons, 4, of Figures 1 and 2. They may have widths and thicknesses in the range of 1/16 to 1/4 inch and should not leave gaps of more than 2 inches. Because they have a stiffening effect on the fabric, this embodiment is somewhat less flexible in use than the one having buttons shown in Figures 1 and 2. The beads need not be parallel, but may be arranged in other patterns.

While we have described certain embodiments in detail, it will be obvious to those skilled in the art that various changes can be made. We therefore wish our invention to be limited solely by the scope of the appended claims.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A material for preventing the entry of roots into unwanted areas comprising a sheet of water-permeable material;

characterised in that the sheet material carries distributed bodies of a polymer blended with from 2 to 30 percent of a 2,6-dinitroaniline; wherein the dinitroaniline is released slowly from the distributed bodies by diffusion from the polymer into the soil juxtaposed the material, thereby to prevent elongation or penetration of the roots into the soil around the material.

2. A material as defined in claim 1 wherein said dinitroaniline is trifluralin.

3. A material as defined in claim 1 or claim 2 wherein said sheet is flexible.

4. A material as defined in any preceding claim wherein said sheet is formed of a non-biodegradable composition.

5. A material as defined in any preceding claim wherein said sheet is a nonwoven fabric of a non-biodegradable polymeric composition.

6. A material as defined in any preceding claim wherein said polymer is blended further with an amount of carbon black sufficient to improve retention of said dinitroaniline.

7. A material as claimed in claim 6 wherein the concentration of carbon black is about 25 percent.

8. A material as defined in any preceding claim wherein said polymer is polyethylene.

9. A material as defined in any preceding claim wherein said polymer is in the form of buttons attached to, and distributed over, said sheet.

10. A material as defined in claim 9, wherein said buttons are 6.3 to 9.45mm (1/4 to 3/8 inch) in diameter and 3.15 to 9.45mm (1/8 to 3/8 inch) maximum thickness.

11. Material as defined in claim 9 or 10 wherein said

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buttons are spaced apart an average of 2.52 to 7.56 cms (1 to 3 inches).

12. A material as defined in any one of claims 1 to 8 wherein said polymer is in the form of elongated beads.

13. A material as defined in claim 12 wherein said beads are 0.158 to 0.63 cm (1/16 to 1/4 inch) wide and from 1.57 to 6.3mms (1/16 to 1/4 inch) in maximum thickness.

14. A material for preventing the entry of roots into unwanted areas substantially as hereinbefore described with reference to the description entitled "Detailed Description".

DATED this 16 day of June 1992

BATTELLE MEMORIAL INSTITUTE
Patent Attorneys for the
Applicant:

F.B. RICE & CO.

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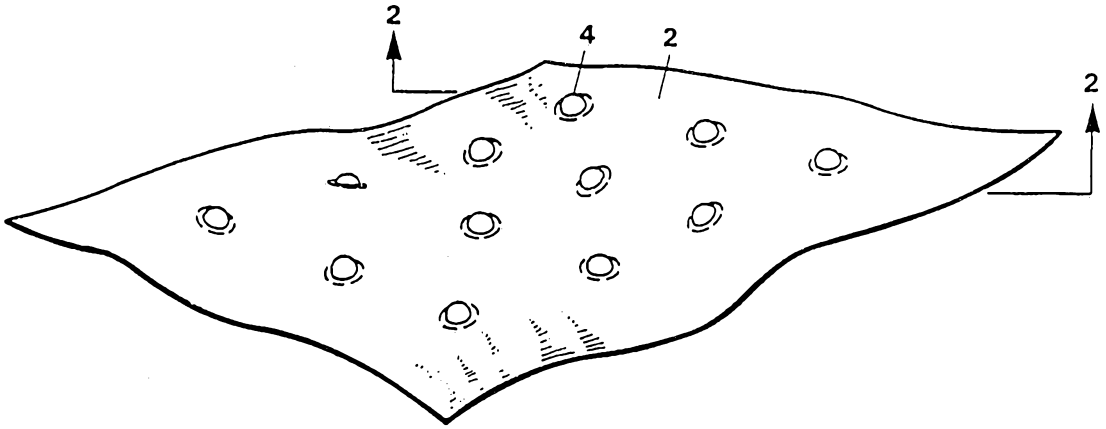


Figure 1

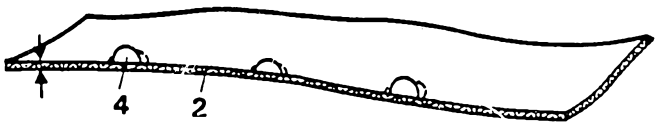


Figure 2

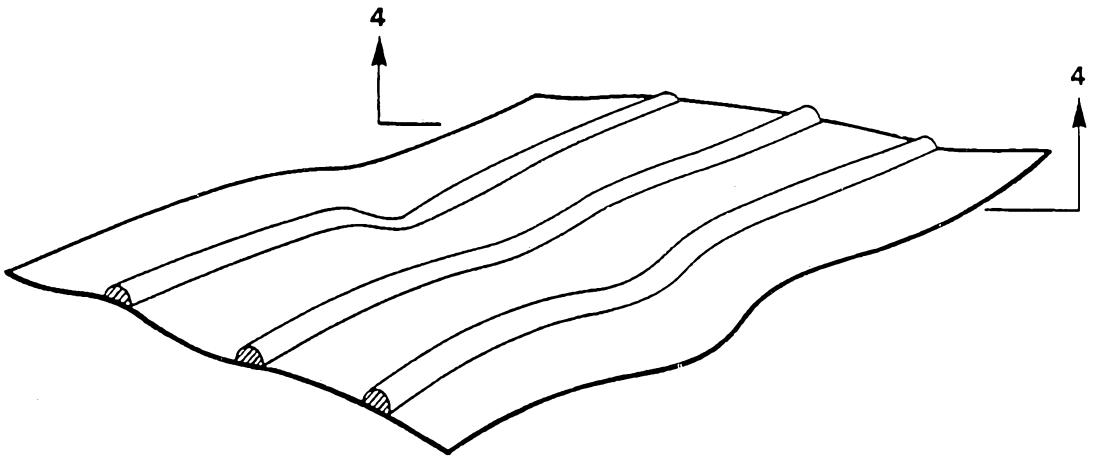


Figure 3

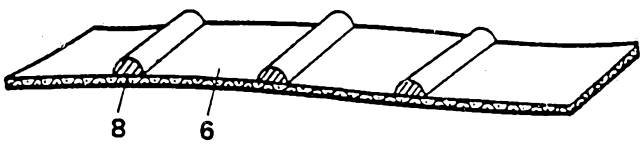


Figure 4

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 88/02853

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[4]: A 01 G 13/02

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[4]	A 01 G

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	US, A, 4350678 (PALVARINI) 21 September 1982 see the whole document	1-11,15, 16
Y	US, A, 3891423 (STANLEY) 24 June 1975 see column 2, lines 4-47; claim 1	1-10,15
Y	US, A, 3939606 (VANDEMARK) 24 February 1976 see the whole document	5,8
Y	FR, A, 1597108 (MITSUBISHI PETROCHEMICAL) 31 July 1970 see page 4, line 1 - page 6, line 9	11,16
A	US, A, 3384993 (KANE) 28 May 1968 see claims 1,2	12,18

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* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
28th November 1988	11 JAN 1989
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	P.C.G. VAN DER PUTTEN

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. US 8802853 SA 24018

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 12/12/88
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4350678	21-09-82	BE-A- 853111	30-09-77
		NL-A- 7703316	04-10-77
		FR-A,B 2345923	28-10-77
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US-A- 3891423	24-06-75	None	
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		NL-A- 7508562	28-11-75
US-A- 3384993		None	