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(54) Title: AQUEOUS ROOTING GEL (57) Abstract Aqueous rooting gel which comprises a thixotropic gel of hectorite in water containing at least 60 ppm, and prefer- ably not more than 200 ppm calcium ions. There is also provided a transparent container including such a rooting gel. The gels are useful for rooting a wide variety of soft wood cuttings, eg fuchsia and geranium.		

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AQUEOUS ROOTING GEL

This invention relates to an aqueous rooting gel, which is preferably translucent.

Plants are frequently propagated by taking cuttings
5 and placing them in a growth medium such as soil or a peat based compost. These conventional growth media suffer from the disadvantage that the growth medium has to be kept moist. Furthermore, the composition of naturally occurring materials such as peat or soil varies and
10 consistently reproducible agronomic results from a number of samples are difficult to obtain.

Thixotropic gels, of various types including gels prepared from silica, clays and organic materials have been proposed in European Patent Application 0 006 299 as
15 propagating media for cuttings. However, we have found that gels prepared in accordance with European Patent Application 0006299 are unsatisfactory in a number of respects and in particular do not comprise a reliable medium for the rooting of cuttings.

20 We have now found that two essential elements are required for a satisfactory cutting medium; firstly the gel has to be a hectorite gel; secondly the gel has to contain at least 60 ppm calcium ions.

According to the invention there is provided an
25 aqueous rooting gel which comprises a thixotropic gel of

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- hectorite in water containing at least 60 ppm calcium ions.

The gel preferably contains at least 75, more preferably at least 90 ppm calcium ions.

The gel suitably contains not more than 200 ppm calcium ions, preferably not more than 150 ppm calcium ions and especially not more than 130 ppm. The gel most suitably contains between 60 and 130 ppm calcium ions, eg 100 ± 10 ppm calcium ions.

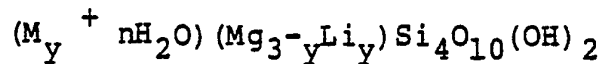
The gels in accordance with the invention are generally clear, and to ensure such clarity it is desirable that the calcium ion concentration is less than 130 ppm.

Gels with a calcium ion concentration of greater than 130 ppm which are sufficiently clear to enable visualisation of roots less than 0.2 cm in length on cuttings placed in the centre of a 7 cm diameter transparent pot may be prepared by adding a calcium ion complexing agent, eg sodium hexametaphosphate, to the gel. The quantity of complexing agent to be added to obtain a sufficiently clear gel will depend on the nature of the complexing agent and on the quantity of calcium ions to be complexed. However we have found that it is possible to prepare clear gels with a total calcium ion concentration of 150 ppm by adding 315 mg/litre of sodium hexametaphosphate. A clear gel having a calcium ion

- concentration of 200 ppm may be prepared by adding 840 mg/litre sodium hexametaphosphate to the gel.

By the term hectorite is meant a trioctahedral clay which is a member of the saponite sub-group of smectites.

- 5 The term hectorite has been ascribed to the natural trioctahedral smectites found at Hector, California, USA. Hectorites can be represented by the general or idealised formula:



- 10 where M is an exchangeable cation, preferably sodium and where y is a number which is generally less than 1.0.

The hectorite may be of natural origin, but more usually is synthetic.

- The hectorite preferably comprises from 58 to 63
15 parts by weight SiO_2 , 25 to 30 parts by weight MgO , 2.2 to 2.8 parts by weight Na_2O , 0.65 to 0.90 parts by weight Li_2O and from 0.15 to 0.40 parts by weight sulphate. It is preferably fluoride free.

- The particle size of the hectorite used in the
20 preparation of the gel is preferably such that at least 98% passes through a 0.25 mm sieve.

- The calcium ion concentration is preferably obtained by the addition of a calcium salt to the water used to prepare the gel, but other methods of incorporation may
25 also be used, such as addition during formation of the

- gel. The calcium salt should be of sufficient solubility to dissolve in the aqueous medium, and may be calcium sulphate, calcium chloride, calcium nitrate or monocalcium phosphate. It is preferred to use calcium sulphate
5 dihydrate.

The concentration of hectorite in the aqueous phase should be sufficient to yield a thixotropic gel which comprises the rooting gel of the invention. It is preferred that the concentration of hectorite is in the
10 range 1 to 10%, preferably 2 to 6%, more preferably 2 to 4% w/v.

It has also been found that the structural integrity of the gel over a period of time may be dependent on the type of container in which it is placed. For example in
15 containers made of transparent polystyrene, polyethylene, or polyvinyl chloride, we have found that the gel tends to fissure. We have identified that this is due to loss of water through the walls of the container.

It has been found that by using containers made of
20 transparent material with very low water transmission rates, this problem is overcome.

According to one embodiment of the invention, there is provided a transparent container including the rooting gel as hereinbefore described.

25 The container is preferably made from a transparent

material with a low water transmission rate.

Suitable materials include, for example, polypropylene, in particular homopolymer polypropylene.

The wall thickness of the container is preferably in the range 0.3 to 0.7, e.g. 0.5mm.

The open end of the container should be covered before and during use, e.g. using a metal foil, in order that water loss from container is minimised. Prior to use, for example, a metal foil closure can be sealed to the rim of the container.

The rooting gel according to the invention may be prepared by any conventional method for the manufacture of a thixotropic gel. The hectorite is dispersed in water, preferably demineralised water, which contains the required amount of the calcium salt, and the rooting gel is obtained, which is filled into the appropriate containers. In a typical procedure the required amount of hectorite is dispersed in water having the preferred calcium ion content, preferably at a temperature between 25 and 35°C, more preferably between 28 and 32°C, with the aid of a high energy mixer.

Providing the calcium content is restricted to below 130 ppm and other additives are avoided, the gel will be translucent, thus permitting root formation to be observed.

The invention is illustrated by the following example.

Example

A thixotropic gel was prepared from 30g of a fluoride free synthetic sodium lithium magnesium silicate hectorite comprising 60 to 61% by weight SiO_2 , 27 to 28% by weight
5 MgO, 2.4 to 2.6% by weight Na_2O , 0.72 to 0.82% by weight Li_2O , 0.21 to 0.29% by weight sulphate, a moisture content of from 6 to 8% by weight, and a weight loss on ignition of 8.8 to 9.1% is dispersed in demineralised water (1 litre) containing 100ppm calcium ions at 30°C
10 using a high energy stirrer. The gel (ca 150ml) was poured into polypropylene pots of 170ml capacity. A polypropylene-aluminium foil laminate lid was applied to the rim of each pot and heat sealed in place. The gel produced was clear and remained clear for at least 18
15 months when stored at ambient temperatures, without forming fissures or deteriorating.

In use, the foil cap was punctured to produce small holes and soft wood cuttings were inserted through the holes into the gel to a depth of 2-4cm. Cuttings were
20 taken according to normal horticultural practice. Where desired, the cuttings were first dipped into rooting hormone.

Roots developed on the cuttings, e.g. fuchsia, hederia, geranium, which could be readily seen. In
25 addition, very little fissuring of the gels occurred

- during the initial rooting period.

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What we claim is:-

1. An aqueous rooting gel which comprises a thixotropic gel of hectorite in water containing at least 60 ppm calcium ions.
- 5 2. A rooting gel according to Claim 1, which contains not more than 200 ppm calcium ions.
3. A rooting gel according to either Claim 1 or Claim 2, which contains from 60 to 130 ppm calcium ions.
4. A rooting gel according to any one of Claims 1 to 3,
10 wherein the hectorite is synthetic.
5. A translucent aqueous rooting gel which comprises a thixotropic gel of hectorite in water containing from 60 to 130 ppm calcium ions.
6. A rooting gel according to any of the preceding
15 claims, wherein the hectorite comprises from 58 to 63 parts by weight SiO_2 , 25 to 30 parts by weight MgO , 2.2 to 2.8 parts by weight Na_2O , 0.65 to 0.90 parts by weight Li_2O and from 0.15 to 0.40 parts by weight sulphate.
- 20 7. A rooting gel according to any one of the preceding claims, wherein the gel comprises from 1 to 10% weight/volume hectorite.
8. A transparent container including rooting gel according to any one of Claims 1 to 7.
- 25 9. A container according to Claim 8, wherein the

container is made from a transparent material with a low water transmission rate.

10. A container according to Claim 8 or 9, wherein the container is made from polypropylene.

5 11. A container according to any one of Claims 8 to 10, having a wall thickness of from 0.3 to 0.7mm.

12. A container according to any one of Claims 8 to 11 including a cover.

13. A container according to Claim 12, wherein the cover
10 is metal foil.

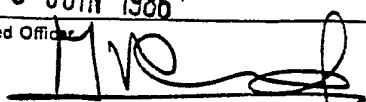
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INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 86/00102

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 9/10		
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 ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	EP, A, 0006299 (FISONS) 9th January 1980, see page 2, lines 3-11; page 7, lines 9-19; page 12, lines 15-23 --	1,8,12
A	US, A, 4241537 (WOOD) 19th December 1980, see column 4, lines 19-62; figure 5 -----	8,9,10
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
21st May 1986	10 JUN 1986	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	M. VAN MOL 	

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 86/00102 (SA 12377)

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 29/05/86

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A- 0006299	09/01/80	None	
US-A- 4241537	30/12/80	None	

For more details about this annex :
see Official Journal of the European Patent Office, No. 12/82