

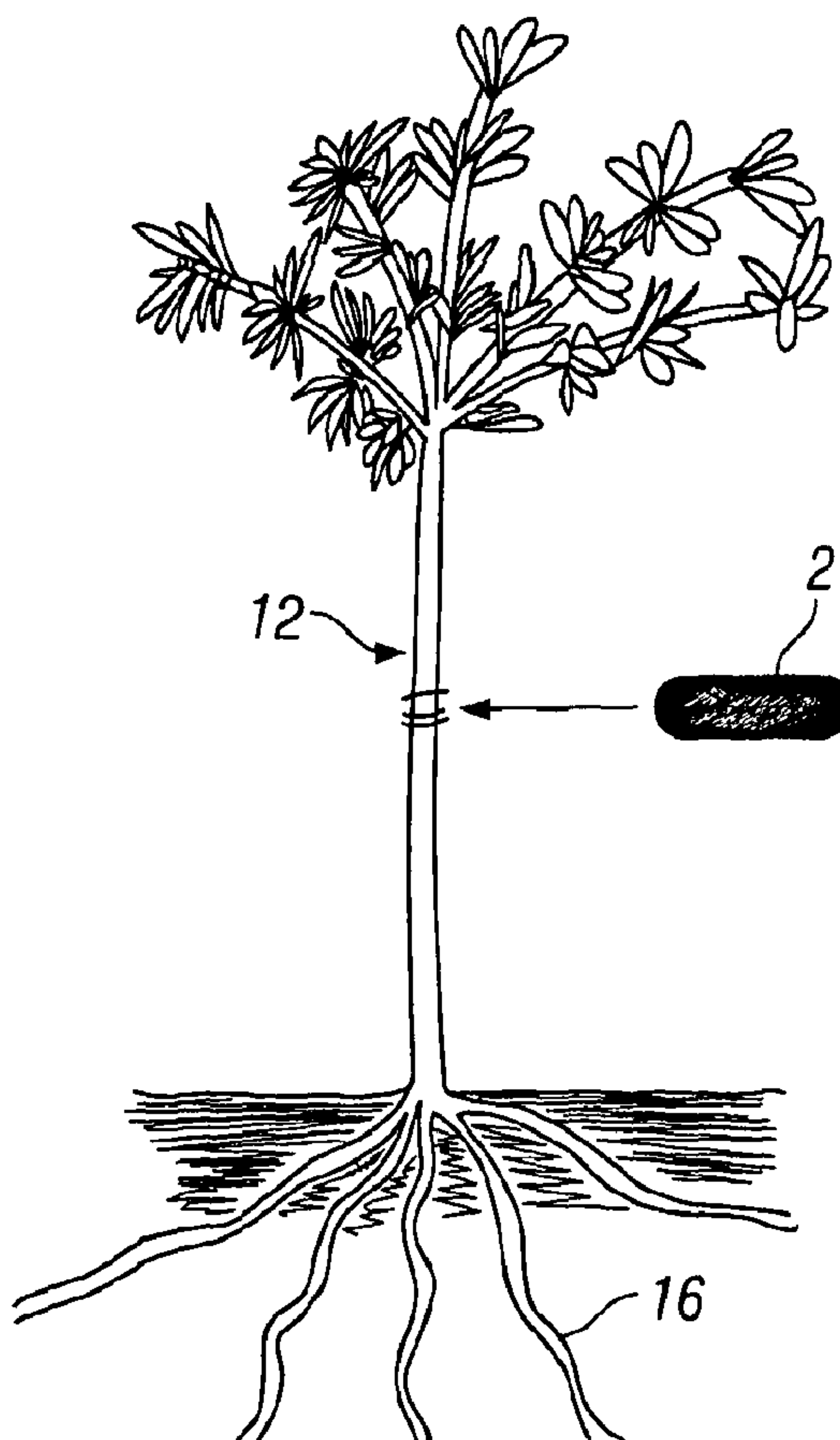


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(71) Demandeur/Applicant:  
GROUNDCOVER DBM LIMITED, GB  
(72) Inventeur/Inventor:  
RICHARDS, IVOR, GB  
(74) Agent: GOWLING LAFLEUR HENDERSON LLP

(54) Titre : ADMINISTRATION D'HERBICIDE  
(54) Title: HERBICIDE DELIVERY

**FIG. 2B**



(57) Abrégé/Abstract:

The present invention relates to a herbicide delivery method and a product for delivery to a plant wherein the plant has a generally hollow stem. A particular example of such a plant is Japanese knotweed. The present invention relates to a method of

(57) **Abrégé(suite)/Abstract(continued):**

administering a herbicide to a plant comprising the steps of providing an opening in the stem of a plant wherein the stem comprises a tubular portion having a cavity therein and inserting a consumable delivery means comprising at least a herbicide into the opening in the stem of the plant. The herbicide may be provided in a consumable capsule.

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(71) Applicant (for all designated States except US):  
**GROUND COVER DBM LIMITED** [GB/GB]; Kenfig  
 Industrial Estate, Margam, Port Talbot SA13 2PE (GB).

## (72) Inventor; and

(75) Inventor/Applicant (for US only): **RICHARDS, Ivor**  
 [GB/GB]; Rossignol, Mold Road, Ruthin LL15 1SL,  
 Denbighshire (GB).

(74) Agent: **BAKER, Thomas**; Urquhart-Dykes & Lord LLP,  
 7 Floor Churchill House, Churchill Way, Cardiff CF10  
 2HH (GB).

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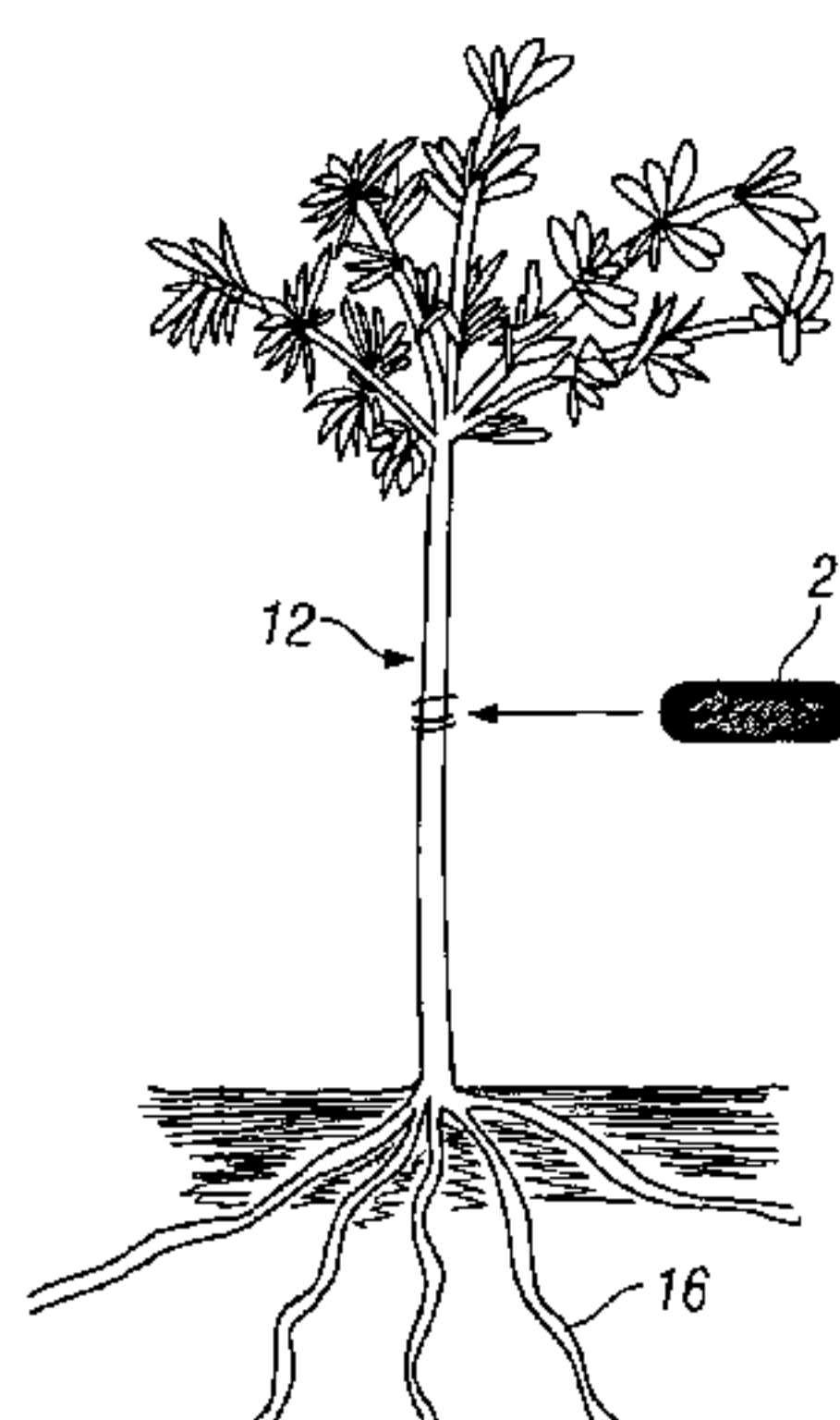
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FIG. 2B



(57) Abstract: The present invention relates to a herbicide delivery method and a product for delivery to a plant wherein the plant has a generally hollow stem. A particular example of such a plant is Japanese knotweed. The present invention relates to a method of administering a herbicide to a plant comprising the steps of providing an opening in the stem of a plant wherein the stem comprises a tubular portion having a cavity therein and inserting a consumable delivery means comprising at least a herbicide into the opening in the stem of the plant. The herbicide may be provided in a consumable capsule.

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### Herbicide Delivery

The present invention relates to a herbicide delivery method and product for delivery to a  
5 plant, the plant characterised by having a hollow stem. An example of such a plant is  
Japanese Knotweed.

Japanese Knotweed is a plant with a bamboo like stem and clusters of creamy flowers.  
The stems are hollow therefore drawing comparisons with bamboo. In the UK Japanese  
10 knotweed has been titled the most invasive plant as it will flourish in any soil however  
poor, and spread relentlessly overwhelming other plants and damaging eco-systems. It has  
the ability to grow through walls, tarmac and concrete and can wreck roads and buildings.  
Japanese knotweed was introduced into the UK in the Victorian era due to its apparent  
beauty however when it started taking over gardens it was thrown away thereby spreading  
15 into the wild. Its rapid spread is down to its toughness and having no natural enemies it is  
not naturally kept under control. An infestation reduces land value and removing it is  
expensive and time consuming as the roots can spread 7 metres wide, and 3 metres deep.  
There are strict legal requirements for getting rid of the roots and contaminated soil is  
classed as a controlled waste which has to be buried at least 5 metres deep on site or taken  
20 away by a licensed operator to a designated landfill site and buried to a depth of 5 metres.  
Many landfill operators would not accept Japanese knotweed and even if they do, charge a  
premium rate due to the requirement for deep burial.

A treatment for eradicating plants such as Japanese knotweed is the use of a spraying  
25 herbicide such as glyphosate, however such a herbicide programme can easily take up to  
three years to be effective and the herbicide must be administered by trained personnel or  
be closely supervised by a trained personnel. This method relies on the natural flow of  
liquids in the plant to transfer the herbicide to the rhizome. The problem lies in ensuring  
that the chemical is absorbed and travels down to the rhizome where dormant buds, which  
30 are the starting point for growth the following year have developed. However, there is  
concern with herbicide treatment in a spray format as the surrounding plants will also be  
affected, and significant volume of herbicide is wasted. Furthermore, spraying is not  
generally effective after one application and is thus repeated over several years.

A further alternative approach for treating knotweed is to deliver a herbicide directly into the hollow core of the plant which increases the ability of the herbicide to pass through the plant's root structure. US7165357 discloses a Japanese knotweed injector system for  
5 injecting a dose of plant killing fluid into the stem of the Japanese knotweed. A needle is provided which is inserted into a stem. The apparatus comprises a trigger which is squeezed and a pre-set volume of herbicide is injected into the stem cavity. The problem with such an apparatus and method of treating knotweed is that trained personnel must use the apparatus and the herbicide is dangerous requiring careful manipulation as the  
10 glyphosate must be prepared beforehand and transferred to a container which is attached to the injector. Furthermore, the apparatus itself is expensive, particularly for use by an amateur gardener wherein occasional or single use only is required.

The present invention overcomes the above-mentioned problems.

15

According to the present invention there is a method of administering a herbicide to a plant, the method comprising the steps of;

- a) providing an opening in the stem of a plant, wherein the stem comprises a tubular  
20 portion having a cavity therein;
- b) inserting a consumable delivery means comprising at least a herbicide into the opening in the stem of the plant.

The herbicide is beneficially provided in a solid form. Significant advantages of treatment  
25 of a plant through this method are achieved as the herbicide can be administered to the plant without the requirement for professional assistance. The herbicide is safe for public use and the application is beneficially in a form wherein at least the peripheral surface is solid and can be administered quickly and easily and be directed specifically to a selected plant. This provides significant advantages over traditional herbicide spraying of the  
30 plants as the herbicide is targeted and will not therefore affect the surrounding environment. A further advantage of such targeted administering of the herbicide is that smaller quantities of herbicide are required. In a tablet or capsule form, the amount of

herbicide present is not harmful to a human, and as such can be supplied for private and non-commercial use.

5 A further advantage resides in the fact that traditional treatments by a trained person requires the person to be extensively trained in handling of the herbicide and treatment techniques. Using the method according to the present invention simplifies the training required. Another advantage of the claimed invention is that the moisture of the plant itself is used to transfer the herbicide to the relevant location in the rhizomes. As such, the  
10 quantity of herbicide reaching the plants can be carefully controlled.

The herbicide is beneficially in a dried format and can therefore be easily handled by an unskilled and untrained user. The herbicide is beneficially granulated and may be in the form of a tablet. Granulated or tablet form of herbicide is even more beneficially  
15 contained in a water soluble capsule. Such capsules are generally used in the art to administer powdered materials to a patient such as a person and may comprise opposing components which may interact with a resistance type fit to form an enclosure. This enclosure may be pre-filled with granulated herbicide or a tablet of herbicide. As the capsule is water soluble, once it is inserted into the opening of the stem of the plant then  
20 the capsule material will dissolve thus releasing the herbicide into the plant.

The capsule is beneficially made out of a gelatinous material. The significant advantage of such a material is that the capsule itself is not harmful to a person and additionally is flexible meaning that it can be deformed without spilling of the herbicide material. The  
25 herbicide material will also “keep” in the capsule and not provide a danger to children or animals. The capsule can therefore be handled without protective clothing and therefore can be used on a non-commercial basis. It will also be appreciated that herbicide in a liquid form may be supplied in a capsule. The capsule is beneficially completely sealed in such an embodiment.

30

The herbicide beneficially includes the active ingredient glyphosate. The glyphosate preferably comprises between 40wt% and 80wt% of the herbicide. Even more

beneficially, the glyphosate comprises 65-75wt% of the herbicide. Even more beneficially, the glyphosate comprises 68wt% of the herbicide.

- 5 The opening in the stem of the plant is beneficially provided by cutting the opening in the stem of the plant. Alternatively the opening may be provided by cutting substantially through the cross section of the stem. Cutting in this manner to remove the top of the plant either partially or completely enables the delivery means including the herbicide to be placed inside the plant.

10

The method may further comprise the step of administering dye (which may also be termed a colouring agent) to the plant into the opening provided in the stem. The dye is beneficially a tracing dye. The dye may comprise potassium permanganate. Even more beneficially, the dye comprises a food grade dye. The dye is beneficially in the form of a powder. The dye is also beneficially water soluble.

15

The provision of such a dye enables significant benefit in that administering a herbicide in the method as disclosed means that the herbicide will take some time (for example 24 hours) to be taken throughout the plant and as such will not immediately show signs of dying. This is particularly true if the top of the plant has been cut off as the stem will only be showing. The provision of a dye means that the dye can be seen in the stem of the plant within a relatively short time (approximately 24 hours) which shows that the plant has been treated and any further treatment is not required. It will then be clear that the plant will be absorbing the herbicide and the dye will also have passed through the plant. The rhizomes will also show colouring thereby confirming that herbicide has entered the rhizomes ensuring the plant is treated effectively.

20

25

Also according to the present invention there is a water-soluble capsule for administering a herbicide to a plant, the capsule retaining a herbicide in granulated form therein.

30

The herbicide preferably includes glyphosate.

The capsule preferably further comprises a dye therein.

The dye is beneficially a drain tracing dye, and beneficially comprises one or more food grade ingredients. Such food grade ingredients are beneficially used as they are not harmful to a person if ingested.

5

The dye is beneficially in a granulated form. This provides the benefit that it can be pre-mixed with the herbicide and the capsule filled with both dye and herbicide ready for use.

Examples of suitable dyes which are commercially available and their colours are green  
10 (acid yellow 73), red (food amaranth), blue (food blue FCF), orange (food sunset yellow), yellow (food tartrazine), purple (food P/N). Such dye materials are beneficially in powdered form and are beneficially water soluble.

Also according to the present invention there is a method of administering a herbicide to a  
15 plant, the method comprising the steps of:

- a) providing an opening in the stem of a plant, wherein the stem comprises a tubular portion having a cavity therein;
- b) inserting a herbicide having a solid form through the opening into the stem of the  
20 plant.

It will be appreciated that the herbicide may be in a number of forms as hereinbefore described such as in the form of a tablet or substantially encapsulated within a delivery means.

25

The present invention will now be described by way of example only with reference to the accompanying drawings (not to scale) in which:

Figure 1 is a schematic exemplary embodiment of a capsule having herbicide  
30 therein according to an exemplary embodiment in the present invention;

Figure 2a and 2b are a schematic exemplary embodiments of the method of treating a plant having a hollow stem according to exemplary embodiment of the present invention.

5

With reference to Figure 1 there is a capsule 2 having a herbicide 4 therein. The herbicide may be provided in various forms. In one embodiment, the herbicide may be provided as a tablet without the outer casing 6 which provides the capsule 2. Such a tablet could be administered to the plant, however, the provision of a capsule is beneficial as the herbicide  
10 does not then come into contact with the person administering the herbicide to the plant.

Beneficially the capsule comprises two halves 8a, 8b. Herbicide is provided in one half of the capsule and the other half, either 8a or 8b is secured to the opposing portion. An overlapping portion is provided between 8a and 8b and connected is achieved by simple  
15 friction fit.

In an alternative embodiment, the capsule may be sealed and comprise a liquid herbicide therein. In such an embodiment, a user will again not come into contact with the potentially harmful herbicide composition, but instead the non-harmful capsule can be  
20 handled by an unskilled user and inserted into the aperture provided in the stem of the plant.

The capsule may have markings thereon to indicate the content of the capsule. The capsule may be made of any material that does not react with the herbicide but must be soluble in  
25 water in order that at least a portion of the capsule dissolves when in contact with water in the plant. The capsule may be made of a gelatinous material such as gelatine and a natural preservative. Such a material is not harmful to a person and therefore the capsule can be manipulated, administered and stored by a user without specific careful storage requirements. The capsule may also be transparent.

30

A dye or pigment material may also be provided within the capsule 6. A suitable material may be for example potassium permanganate, however food grade dyes are beneficially used as such dyes are not harmful to animals or people if ingested. Such a material

provides a distinctive colour to herbicide/dye mixture and once dissolved in the plant shows through the stem of the plant thus confirming that treatment has been completed. A responsible person can therefore be confident that the plant is being treated and will subsequently die without further treatment.

In a preferred embodiment, a powdered dye is provided which in contact with water dissolves. The dye may be provided with the herbicide and a powdered mixture may therefore be provided which may be formed into a tablet or alternatively provided in a capsule. The dye is beneficially a food grade dye which may be green (acid yellow 73), red (food amaranth), blue (food blue FCF), orange (food sunset yellow), yellow (food tartrazine), purple (food P/N). The dye may be provided as 0.1% dye to herbicide (for example glyphosate) ratio. It will be appreciated that a wide range of percentage of dye may be provided in order to achieve the desired effect. Approximately 0.001% dye to a herbicide is believed to have the desired effect. In an embodiment wherein a capsule is provided having a liquid herbicide therein, the dye may be provided mixed with the liquid herbicide. In such an embodiment the dye will be present in an aqueous form and as such will colour the mixture in the capsule giving a clearly identifiable product. The beneficial effect of a food grade dye is that it is non toxic and complies with National Rivers Authority Guidelines.

Referring to Figure 2a, there is exemplary embodiment of the method of treating the plant according to the exemplary embodiment of the present invention. The stem of the plant 12 is shown and the top of the plant has been cut off to leave an opening 14. Roots of the plant 16 extend under the ground. As the stem 12 is hollow a capsule 2 may be dropped into the opening 14 and treatment of the plant has therefore been completed. Such a treatment of programme is quick, directed to a specific plant, and is also effective as the necessary dose of herbicide is applied to each plant. This ensures that herbicide is not wasted nor does the herbicide unintentionally kill any surrounding plants that would occur with spray treatment. Such directed treatment ensures that enough herbicide is present to kill the plant. Within approximately 24 hours, the capsule will dissolve and the herbicide will be taken into the plant. At this time the dye or pigment is also released from the capsule and this will be visible through the stem 12 of the plant.

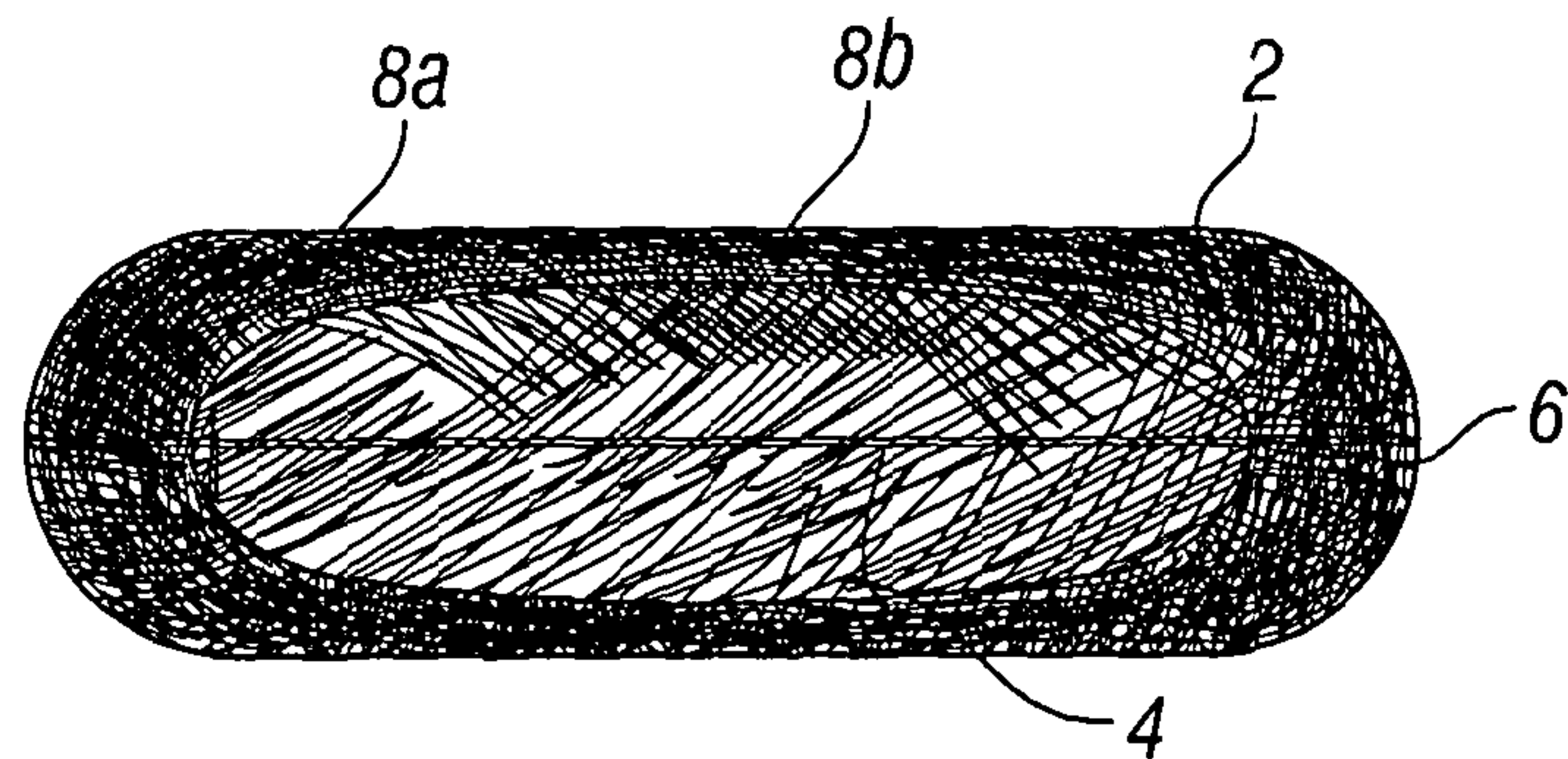
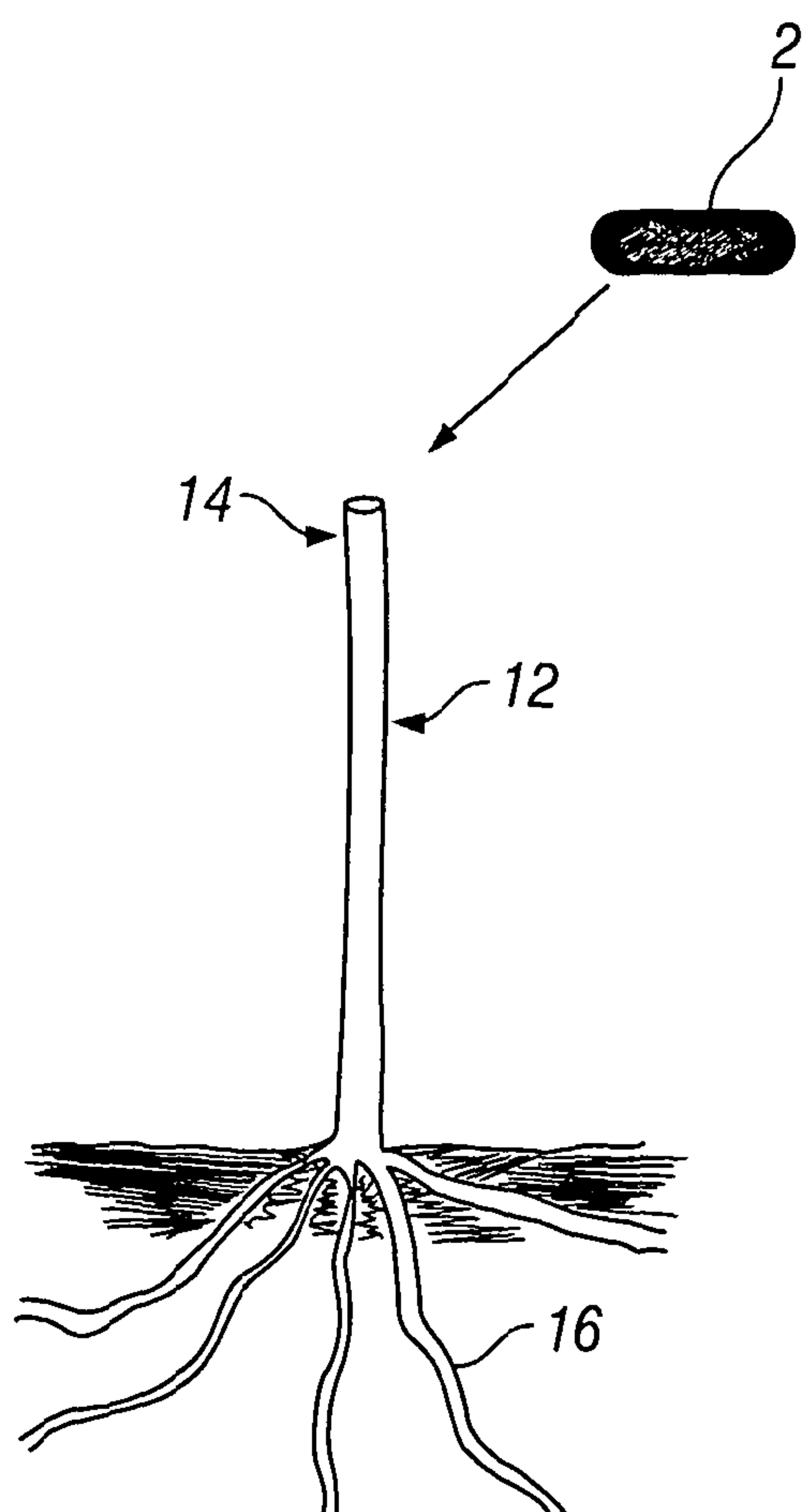
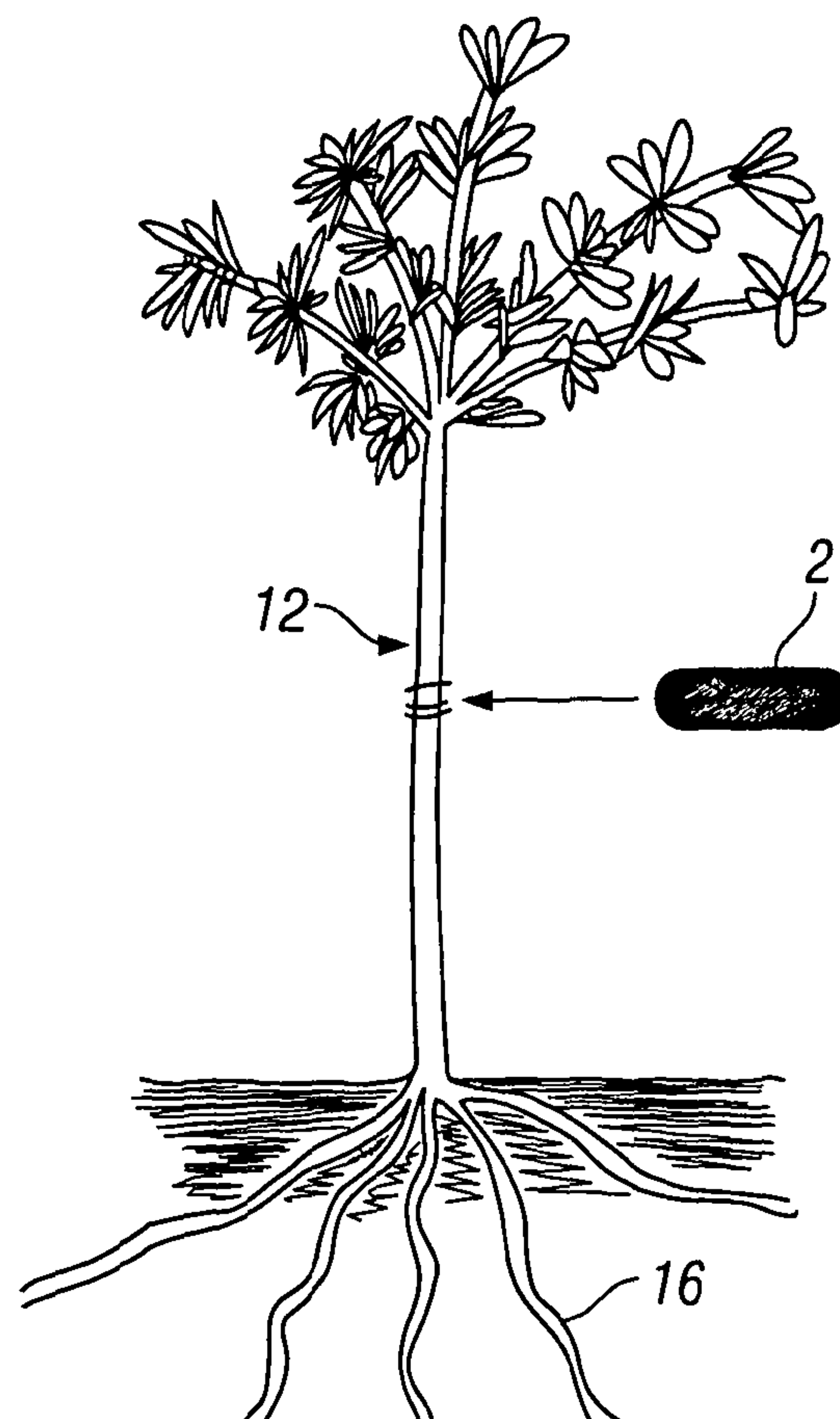
Referring to figure 2b, in an alternative method according to an alternative exemplary embodiment of the present invention, an aperture 15 may be provided in the stem of the plant. The capsule 2 may be inserted into the stem and again treatment will then be  
5 completed.

The present invention has been described by way of example only and it will be appreciated by a skilled addressee that variations and modifications may be made to the present invention without departing from the scope of protection afforded by the appended  
10 claims.

Claims

1. A method of administering a herbicide to a plant, the method comprising the steps  
5 of:
  - (a) providing an opening in the stem of a plant, wherein the stem comprises a tubular portion having a cavity therein;
  - (b) inserting a consumable delivery means including a herbicide into the  
10 opening in the stem of the plant.
2. A method according to claim 1 wherein the herbicide is in a solid form.
3. A method according to any preceding claim wherein the herbicide is granulated.  
15
4. A method according to any preceding claim wherein the herbicide is in the form of a tablet.
5. A method according to any preceding claim wherein the consumable delivery  
20 means is a water soluble capsule.
6. A method according to claim 5 and claim 3 wherein the granulated herbicide is received in the water soluble capsule.
- 25 7. A method according to any of claims 5 or 6 wherein the capsule comprises a gelatinous material.
8. A method according to any preceding claim wherein the herbicide includes the active ingredient glyphosate.
- 30 9. A method according any preceding claim wherein the opening is provided by cutting the opening in the stem of the plant.

10. A method according to any of claims 1-8 wherein the opening is provided by cutting substantially the cross section of the stem.
- 5 11. A method according to any preceding claim further comprising administering a dye to the plant into the opening.
12. A method according to claim 11 wherein the dye is water soluble.
- 10 13. A method according to any of claims 11-12 wherein the dye is in a powdered form.
14. A method according to any of claims 11-13 wherein the dye comprises a food grade dye.
- 15 15. A water-soluble capsule for administering a herbicide to a plant, the capsule retaining a herbicide in granulated form therein.
- 20 16. A water-soluble capsule according to claim 15 wherein the herbicide includes glyphosate.
17. A water-soluble capsule according to any of claims 15-16 wherein the capsule further comprises a dye therein.
- 25 18. A water-soluble capsule according to claim 17 wherein the dye is in granulated form.
19. A water-soluble capsule according to any of claims 15-18 wherein the dye is a food grade dye.

**FIG. 1****FIG. 2A****FIG. 2B**

**FIG. 2B**

