

/103



AVISO DE NOTIFICACION
CORREO CERTIFICADO


Industria y Comercio
SUPERINTENDENCIA

Radicación : 5-18883- -12-0 Fecha: 2010-06-28 08:47:05
Trámite : 11 PATENTEIYII
Evento : 379 FASENACIONALII
Actuación : 432 COMUNICACTOADM
Destinatario : JESUS ABELARDO CARDENAS ALFARO Folios 1

Señor (a) (es)
JESUS ABELARDO CARDENAS ALFARO
CARRERA 7 NO. 74-56 OFICINA 804
BOGOTA D.C.

Referencia RESOLUCION : 32849
Fecha : 25/06/2010
Expediente : 5-18883
Trámite : 11 PCT-PATENTE DE INVENCION CAPITULOS I Y II
Evento : 379 FASE NACIONAL INCLUIDO CAPITULO II
Actuación : 432 COMUNICACION ACTO ADMINISTRATIVO

Comedidamente le solicito presentarse a este Despacho ubicado en la Carrera 13 No. 27 - 00 Piso Tercero (3), de la ciudad de Bogotá D.C., dentro del término de cinco (5) días hábiles contados a partir del envío de la presente citación, en horario de 8:00 a.m. a 4:30 p.m. jornada continua, con el fin de notificarle personalmente el contenido de la resolución de la referencia proferida dentro del expediente tramitado con el número de radicación citado en el asunto.

De no hacerse presente en el término indicado anteriormente, la providencia en mención se notificará por edicto, el cual se fijará por el término de diez (10) días en el Centro de Documentación e Información.

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En caso de que se haya notificado, haga caso omiso de este aviso.

Secretaría General
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

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REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

RESOLUCION No. E32843

Por la cual se deniega una patente de invención

Rad. PCT/05-18883

EL SUPERINTENDENTE DE INDUSTRIA Y COMERCIO

en ejercicio de sus facultades legales, en especial de las conferidas en el numeral 38 del artículo 3° del Decreto 1687 de 2010, y

CONSIDERANDO:

PRIMERO: Que mediante escrito radicado en esta Superintendencia el día 01 de marzo del 2005 con el N° 05018883-00000000, el doctor Jesús Abelardo Cárdenas Alfaro, en su calidad de apoderado de Lta Resource Management, presentó la solicitud de patente de invención titulada "MEJORADOR DE TRANSPORTE DE PROTEÍNA EN PLANTAS TRANSGÉNICAS", correspondiente a la solicitud internacional PCT/US 2003/023823 de fecha 31 de julio del 2003, para que se iniciara la fase nacional en virtud del Tratado de Cooperación en Materia de Patentes (PCT).

SEGUNDO: Que efectuado el examen de forma en cuanto a los requisitos que debe llenar la solicitud y cumplidas las exigencias legales, se ordenó publicar el extracto sin que se hubieran presentado oposiciones por parte de terceros.

TERCERO: Que el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina establece que: *"Si la oficina nacional competente encontrara que la invención no es patentable o que no cumple con alguno de los requisitos establecidos en esta Decisión para la concesión de la patente, lo notificará al solicitante. Este deberá responder a la notificación dentro del plazo de sesenta días contados a partir de la fecha de la notificación. Este plazo podrá ser prorrogado por una sola vez por un período de treinta días adicionales. (...) Si el solicitante no respondiera a la notificación dentro del plazo señalado, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, la oficina nacional competente denegará la patente"*.

CUARTO: Que de conformidad con lo dispuesto en el artículo 45 antes mencionado, se realizó el examen de fondo y se requirió al solicitante para que presentara respuesta a las observaciones de carácter técnico visibles a folios 87 a 96, formuladas en relación con la patentabilidad o cumplimiento de los requisitos establecidos por la Decisión 486 de la Comisión de la Comunidad Andina, para la concesión de la patente, sin que frente a dicho requerimiento el solicitante se hubiera pronunciado y, en consecuencia, el Despacho procederá a denegar la patente.

REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

RESOLUCION No. 32842

Por la cual se deniega una patente de invención

Rad. PCT/05-18883

RESUELVE:

ARTICULO PRIMERO: Denegar la patente de invención titulada "MEJORADOR DE TRANSPORTE DE PROTEÍNA EN PLANTAS TRANSGÉNICAS", que entró en fase nacional en virtud del Tratado de Cooperación en Materia de Patentes (PCT).

ARTICULO SEGUNDO: Notificar personalmente el contenido de la presente resolución al doctor Jesús Abelardo Cárdenas Alfaro, en su calidad de apoderado de Lta Resource Management, o a quien haga sus veces, entregándole copia de la misma y advirtiéndole que contra ella procede el recurso de reposición, ante el Superintendente de Industria y Comercio, el cual podrá ser interpuesto en el momento de la notificación o dentro de los cinco 5 días hábiles siguientes a ella.

NOTIFÍQUESE Y CUMPLASE

Dada en Bogotá, D.C., a los 25 JUN. 2010

EL SUPERINTENDENTE DE INDUSTRIA Y COMERCIO (E)


GIANCARLO MARCENARO JIMÉNEZ

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202021



US006232270B1

(12) **United States Patent**
Branly et al.

(10) **Patent No.:** **US 6,232,270 B1**
 (45) **Date of Patent:** **May 15, 2001**

(54) **AGRICULTURAL COMPOSITIONS
 CONTAINING BACTERIA**

(75) Inventors: **Keith Branly**, Germantown, TN (US);
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(73) Assignee: **Micro Flo Company**, Memphis, TN
 (US)

(*) Notice: Subject to any disclaimer, the term of this
 patent is extended or adjusted under 35
 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/308,926**

(22) PCT Filed: **Nov. 29, 1996**

(86) PCT No.: **PCT/US96/19116**

§ 371 Date: **Sep. 9, 1999**

§ 102(e) Date: **Sep. 9, 1999**

(87) PCT Pub. No.: **WO98/23157**

PCT Pub. Date: **Jun. 4, 1998**

Related U.S. Application Data

(63) Continuation-in-part of application No. 08/453,683, filed on
 May 30, 1995, now Pat. No. 5,650,372.

(51) Int. Cl.⁷ **A01N 43/66; A01N 57/02;**
A01N 63/00

(52) U.S. Cl. **504/117; 504/127; 504/130**

(58) Field of Search **504/117, 127,**
504/130

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(57) **ABSTRACT**

An agriculturally effective active ingredient is applied to
 plant foliage before, after, or simultaneously with an
 enhancer component containing a substantially pure bacte-
 rial culture, suspension, spores, or cells of a bacteria selected
 from the genus *Bacillus* or a soil bacteria.

51 Claims, No Drawings

plant tissue mass in the roots, stems, and leaves to provide higher levels of nutrient transfer while, at the same time, restricting vegetative growth to enhance fruit production.

The technology of plant herbicides has a continuing desire for enhanced efficacy without a corresponding increase in the application rate. Many herbicides could also use a boost in activity without an increase in the amount of applied herbicide. Farmers and herbicide manufacturers are often faced with a need to control weeds and noxious plants without exceeding the application levels of proven herbicides, if the plants can be controlled at all. Some plants, like Florida Pusley, Bull Grass, Bermuda grass, Dog Fennel, and Primrose are all highly resistant to herbicides proven to be effective.

It would be useful to have a means for increasing the efficacy of agriculturally active ingredients, such as herbicides, without increasing the amount of the applied active ingredient.

SUMMARY OF THE INVENTION

It is an objective of the present invention to provide a composition and method of use therefore to increase the efficacy of agriculturally effective active ingredients.

It is a further objective of the invention to provide a composition and method for its use on fruit-producing plants and seeds that increases the number of fruiting sites on treated plants with the goal of providing increased yields of fruit.

It is another objective of the invention to provide a composition and method for its use in which treated plants grow in a more healthy condition.

In accordance with these and other objectives of the invention that will become apparent from the description herein, a composition according to the invention comprises: (a) an agriculturally effective active ingredient, and (b) an enhancer containing a culture containing bacteria from the genus *Bacillus* or a soil bacteria in the form of cells, cultures, or suspensions and in an amount sufficient to enhance the effectiveness of said active ingredient. Preferably, the enhancer is free of plant growth hormones when used in combination with plant growth stunting agents, like mepiquat chloride, that suppress plant growth hormones in the treated plant.

Compositions according to the present invention improve the efficacy of the applied agriculturally active ingredient. The same amount of active material that is conventionally applied will be more effective. Lower levels of active ingredient can be used to achieve the same effect as the higher conventional application rate. In addition, plants that have treated with compositions according to the invention are healthier with the attendant benefit of being more resistant to disease or other stress as well as exhibiting higher numbers of fruiting sites and increased yields.

DETAILED DESCRIPTION

The invention provides a method for treating plants with a composition containing an agriculturally effective active ingredient and an enhancer containing a culture of a bacteria selected from the genus *Bacillus* or a soil bacteria in an amount sufficient to enhance the effectiveness of an agriculturally effective active ingredient applied simultaneously, before, or after application of the enhancer. The increased effectiveness attributable to the bacteria-containing enhancer component can be used to reduce the amount of applied agriculturally effective active ingredient or, when

the active ingredient is applied at the same rate, the bacillus increases the effectiveness of the applied agriculturally effective active ingredient. Such increased effectiveness is useful for controlling weeds that are otherwise difficult to control with regular herbicides.

The Bacteria-Containing Enhancer

The enhancer component contains spores, cultures, and suspensions of a bacteria from the genus *Bacillus* or a soil bacteria. Preferably, the bacteria for the enhancer component is in the form of spores as a result of a suitable adjustment in temperature, pH, salinity, etc.

Suitable bacteria for use in the present invention include those bacteria that exhibit an ability to increase the effectiveness of an agriculturally effective active ingredient by any mechanism. Methods for screening bacterial strains for bioactivity and therefore their capacity to enhance the effectiveness of a plant growth regulator, a herbicide, a systemic fungicide, or a systemic insecticide will be apparent to one of ordinary skill in the art in view of the disclosure and examples set forth herein. For example, a candidate bacterial strain, such as a *Bacillus cereus*, can be cultured and maintained under standard laboratory conditions. (See e.g., Sambrook et al. "Molecular Cloning: A Laboratory Manual" Cold Spring Harbor Laboratory press (1989)). Specific plants can be chosen for their susceptibility or resistance to a particular agriculturally effective compound such as a herbicide or a plant growth regulator. For example, and as set forth in the Example section contained herein, cotton can be used to evaluate the bioactivity of a bacterial strain in combination with a plant growth regulator as reflected in the number of fruiting sites and/or the number of bolls produced and compared to treating similar plants with only the plant growth regulator or the bacteria. Alternatively, plants susceptible to certain fungal diseases, such as tomato leaf blight, potato scab, wheat stem rust, corn smut, or leaf rust of various plant species, can be grown under controlled conditions and treated either with an appropriate fungicide, a fungicide with a candidate bacteria species, or the bacterial species alone, either before, concurrently, or subsequent to controlled inoculation of the plants with the disease causal organism, to evaluate the capacity of the bacterial species to enhance the activity of the fungicide. These types of experiments can be carried out in the field, under semi-controlled conditions such as a greenhouse, or under relatively controlled conditions such as within a growth chamber. These experiments involve routine screening of organisms for their enhancement effect with compounds or compositions on known plant species, and the parameters used to evaluate the effects are likewise known and routinely measured.

These similar types of screens can be utilized with bacterial strains described herein to provide an enhancement effect to a particular agriculturally effective active ingredient, i.e., the *Bacillus cereus* strain deposited with the American Type Culture Collection as ATCC 55675 providing an enhancement effect to the plant growth regulator mepiquat chloride and the herbicide atrazine, to screen the bacterial species for potential enhancement with other agriculturally effective active ingredients, such as systemic insecticides and systemic fungicides.

Particularly preferred are cultures, spores, and suspensions of soil bacteria encountered between and among the roots of thriving growths of the plant type in the local soil. Foliar application of the local soil bacteria at an application rate within the range from about 0.1×10^{10} CFU/acre to about 10×10^{10} CFU/acre enhances the natural mechanisms asso-

<i>Pseudomonas aeruginosa</i>	ATCC 15575
<i>Pseudomonas fluorescens</i>	ATCC 27505
<i>Pseudomonas glathei</i>	ATCC 21697 (<i>Achromobacter nitriloclastes</i>)
<i>Rahnella aquatilis</i>	ATCC 15811
<i>Saccharobacterium acuminatum</i>	5 ATCC 4925 (<i>Bacillus nigrificans</i>)
<i>Saccharomonospora viridis</i>	ATCC 27370
<i>Serratia marcescens</i>	ATCC 6051a
<i>Streptomyces anandii</i>	ATCC 7003
<i>Streptomyces aureofaciens</i>	ATCC 11838
<i>Streptomyces chartreusis</i>	10 ATCC 15563
<i>Streptomyces cyaneus</i>	ATCC 33234
<i>Streptomyces cymarogenes</i>	ATCC 25369
<i>Streptomyces diastatochromogenes</i>	ATCC 27689
<i>Streptomyces flavogriseus</i>	ATCC 55033
<i>Streptomyces gelaticus</i>	15 ATCC 13933
<i>Streptomyces hygroscopicus</i>	ATCC 15244
<i>Streptomyces indigocolor</i>	ATCC 27328
<i>Streptomyces katrae</i>	ATCC 12695
<i>Streptomyces lipmanii</i>	ATCC 12100
<i>Streptomyces longisporus</i>	20 ATCC 21554
<i>Streptomyces massasporeus</i>	ATCC 21555
<i>Streptomyces nobilis</i>	ATCC 15561
<i>Streptomyces odorifer</i>	ATCC 15562
<i>Streptomyces omiyaensis</i>	ATCC 9799
<i>Streptomyces parvulus</i>	25 ATCC 12711
<i>Streptomyces phaeochromogenes</i>	ATCC 14593
<i>Streptomyces pseudogriseolus</i>	ATCC 4944
<i>Streptomyces roseoflavus</i>	ATCC 31002
<i>Streptomyces rubiginosohelvolus</i>	ATCC 31004
<i>Streptomyces rutgersensis</i>	30 ATCC 9943
<i>Streptomyces sclerogranulatus</i>	ATCC 13407
<i>Streptomyces toxytricini</i>	ATCC 7067
<i>Streptomyces violaceoruber</i>	ATCC 29056
<i>Streptomyces violaceus</i>	ATCC 31524
<i>Streptomyces violarius</i>	35 ATCC 31526
<i>Thermoactinomyces vulgaris</i>	ATCC 21359
<i>Thiobacillus denitrificans</i>	ATCC 21360
<i>Thiobacillus thioparus</i>	ATCC 13954
non-fluorescent <i>Pseudomonas</i>	ATCC 13955
<i>Rhizobium</i>	40 ATCC 15044
<i>Agrobacterium</i>	ATCC 33677
<i>Corynebacterium ureafaciens</i>	ATCC 31003
<i>Arthrobacter ureafaciens</i>	ATCC 31522
<i>Pseudomonas aeruginosa</i>	ATCC 465 N.
<i>Bacillus fastidiosus</i>	45 ATCC 12432
<i>Micrococcus denitrificans</i>	ATCC 43223
<i>Mycobacterium phlei</i>	ATCC 13952
<i>Aerobacter aerogenes</i>	ATCC 13953
<i>Fusarium moniliforme</i>	ATCC 14662
<i>Histoplasma capsulata</i>	50 ATCC 15039
<i>Penicillium chrysogenum</i>	ATCC 15040
Particularly useful are species of <i>B. subtilis</i> , <i>B. cereus</i> , and	ATCC 15041
<i>B. megaterium</i> . <i>Bacillus subtilis</i> and <i>B. cereus</i> are naturally	ATCC 15042
occurring soil saprophytes found throughout the world. In	ATCC 15043
the 1992 edition of the American Type Culture Collection,	55 ATCC 15181
182 different strains of <i>B. subtilis</i> are listed and incorporated	ATCC 15182
herein by reference. The following is a list of <i>B. subtilis</i> that	ATCC 15183
would be useful in the present invention:	ATCC 15184
<i>B. subtilis</i>	ATCC 21183
	60 ATCC 21336
ATCC 10783	ATCC 49343
ATCC 15818	ATCC 6537
ATCC 15819	ATCC 21394
ATCC 15245 (<i>Bacillus natto</i>)	ATCC 8473
ATCC 15134 (<i>Bacillus uniflagellatus</i>)	65 ATCC 31523
ATCC 13542	ATCC 31525
ATCC 13472	ATCC 31527

ATCC 21929 (*Bacillus cereus*).
 ATCC 13367
 ATCC 31429
 ATCC 31293
 ATCC 21366 (*Bacillus coagulans*)
 ATCC 25621 (*Bacillus medusa*)
 ATCC 7039 (*Bacillus metiens*)
 ATCC 14893 (*Bacillus subtilis*).
 ATCC 9818 (*Bacillus lactis*)
 ATCC 33018
 ATCC 33019
 ATCC 55055
 ATCC 53522
 ATCC 13366
 ATCC 7064 (*Bacillus siamensis*)
 ATCC 11949
 ATCC 10792 (*Bacillus cereus*)
 ATCC 27348
 ATCC 23260 (*Bacillus endorhythmos*)
 ATCC 13061
 ATCC 13062 (*Bacillus megaterium*)
 ATCC 25972
 ATCC 14579
 ATCC 19646
 ATCC 49064
 ATCC 11778
 ATCC 39152

ATCC 19146 FDA Strain PCI 818 (*Pseudomonas*
 sp.)

A preferred *B. cereus* strain for use in the present invention includes strain ATCC No. 55675. In another embodiment, the *B. cereus* strain for use in the present invention has the characteristics as ATCC No. 55675. In yet another embodiment, the *B. subtilis* strain for use in the present invention has the characteristics as ATCC No. 55675.

The following is a list of *B. megaterium* that would be useful in the present inventions:

B. Megaterium

ATCC 33166
 ATCC 33167
 ATCC 33168
 ATCC 33169
 ATCC 12872
 ATCC 33164
 ATCC 11478
 ATCC 33165
 ATCC 11561
 ATCC 11561a
 ATCC 11561b
 ATCC 11561c
 ATCC 11561d
 ATCC 11561e
 ATCC 6458
 ATCC 6459
 ATCC 14946
 ATCC 27327
 ATCC 33729
 ATCC 9885
 ATCC 13639
 ATCC 13632
 ATCC 15374
 ATCC 49099
 ATCC 49096

ATCC 43725
 ATCC 19136
 ATCC 25848
 ATCC 4531
 5 ATCC 13402
 ATCC 15046
 ATCC 15047
 ATCC 25300
 ATCC 19390
 10 ATCC 13368
 ATCC 21181
 ATCC 35985
 ATCC 39383
 ATCC 11562
 15 ATCC 15127
 ATCC 15128
 ATCC 7703
 ATCC 14945
 ATCC 15177
 20 ATCC 19218
 ATCC 25833
 ATCC 15450
 ATCC 19135
 ATCC 19137
 25 ATCC 21916
 ATCC 8245
 ATCC 15781
 ATCC 31294
 ATCC 15117
 30 ATCC 15118
 ATCC 19160
 ATCC 19161
 ATCC 89
 ATCC 21209
 35 ATCC 35076
 ATCC 49098
 ATCC 39118
 ATCC 7051
 ATCC 7052
 40 ATCC 10778
 ATCC 8011
 ATCC 7056
 ATCC 14581
 ATCC 13062
 45 ATCC 49097
 ATCC 19213
 ATCC 71
 ATCC 35075
 ATCC 21603
 50 ATCC 21738
 ATCC 72
 ATCC 21737
 ATCC 49095
 ATCC 15451
 55

The Active Ingredients

Agriculturally effective ingredients used in the present invention can be selected from a wide variety of materials that act on and through the metabolism of the treated plants.
 60 For premixed materials, it is desirable to select active ingredients that do not degrade or otherwise become impaired by extended storage at the conditions used to maintain the bacteria-containing enhancer component in a spore form.

65 The general term "plant growth regulating agent" encompasses a number of active ingredients that affect a plant in different ways. Generally speaking, plant growth regulators

It should be noted that formulations according to the present invention desirably do not include combinations of materials that attempt to act in a contradictory fashion on the plant metabolism. For example, mepiquat chloride is commonly used on cotton foliage to suppress plant growth hormones and stunt the vegetative growth of the plant. A formulation would preferably not be prepared that included plant growth hormones because the effects of the mepiquat chloride and the growth hormones would place inconsistent demands on the plant metabolism, reduce the efficacy of the mepiquat chloride, and lead to inconsistent results. With the present invention, however, the combination of mepiquat chloride and ATCC 55675 consistently produces treated plants that have higher yield, more healthy growth, and a higher resistance to disease.

While not wishing to be bound by any particular theory of operation and with respect to the combined use of the bacteria-containing enhancer and mepiquat chloride on cotton, the bacteria appears to be affecting the plant growth mechanism to increase the retention of bolls on fruiting sites 1 and 2 and increasing the number of bolls overall by producing and retaining fruiting sites on normally vegetative branches.

For the present invention, mepiquat chloride is used at the application rates and during the conventional stages of cotton plant growth. Conventionally applied rates of mepiquat chloride are up to about 60 g/acre (25 g/acre) or about 1-16 ounces per acre with individual application rates falling within the range from about 2.5 g/acre (1.0 g/hectare) for a 2 ounce/acre application of 4.2 wt % solution to 10 g/acre (4.1 g/hectare) for an 8 ounce/acre application of the same 4.2 wt % solution. If mepiquat chloride of higher or lower purity and/or activity is used, the specific application rate should be adjusted up or down according to the change in conventional mepiquat chloride activity.

EXAMPLES

Example 1

An aqueous mixture of 4.2 wt % mepiquat chloride and 560,000 CFU/ml *B. cereus* (lab sample BP01, ATCC 55675) was prepared in a 1:1 volumetric ratio. This solution was applied by conventional sprayer in four applications to the foliage of growing cotton plants in test areas of fields A (10 of 50 acres in Mississippi) and B (8 of 60 acres in Tennessee). Field A was treated with one dose at the range of 4 fluid ounces per acre followed in five weeks by a treatment at the rate of 8 fluid ounces per acre.

Field B received a different treatment regiment. The first three applications in Field B were at the rate of 4 fluid ounces per acre. (The first and second were 24 days apart. The second and third were at 6 days apart). The final application in Field B was at the rate of 8 fluid ounces per acre 11 days later. In all cases, the control fields were treated with the same rate of only mepiquat chloride.

After treatment, sampling in Fields A and B was conducted by hand of representative rows. All known biases were placed in favor of the control treatment with only mepiquat chloride.

In Fields A and B, beginning and final plant heights of the treated cotton plants was measured. The total plant heights of the control fields was comparable to those treated according to the invention. See, Table 1.

TABLE 1

Field	Beginning Height (in.)	Final height (in.)
A - Control	293	601
A - Treated	291	597
B - Control	338	580
B - Treated	334	636

During the growing season, the differences between the control and treated plants were readily observed. When the young plants contained only squares in the first month of fruiting, an unusually high number and size of additional fruiting branches were seen where the primary fruiting branch exits the main stem. Many were as large or almost as large as the primary fruiting branch and contained fruit prior to first bloom. Extra fruit was also observed at the intersection of the fruiting branches and main stem.

As the bloom extended up the plant and only bolls or missing sites were found below the bloom, an unexpected amount of back fruiting was also observed. Double fruiting was observed in squares, blooms, small bolls, and "now open bolls" (rare). Although double fruiting occurred in both the control and treated plants, the instances were higher in the treated plants.

About 3-4 weeks before the end of the growing period, the plants were inspected for the number of fruiting sites, the number of bolls on nodes 1 and 2, as well as the type of boll. Table 2 reports the results of that inspection.

TABLE 2

Field	Sites	Bolls	%	Open Bolls	Open + Green	Other Bolls
A - Control	240	115	48	73	270	25
A - Treated	292	155	53	173	359	103
B - Control	344	207	60	—	—	81
B - Treated	366	234	64	—	—	163

In Field B and at the end of the test period, 20 plants were inspected. The plants were at cut-out. There were no open bolls in the control group and only 7 in the treated group. The younger fruit, however, were larger and older for the treated plants compared to the control plants. This indicates that the treated plants were growing at a faster and more favorable rate. The treated plants had a total of 265 bolls compared to 238 bolls for the control group, an improvement of 11%.

The treated plants also exhibited an increase in the number of fruit on the vegetable branches in the ratio of 86:50 (72% increase). The treated plants also produced an increase in other fruit, i.e., those on fruiting branch positions 3 and wider, at the ratio of 86:50 (72% increase). The estimated weight (seed cotton) of the fruit from the 20 plants was also higher in the treated plants, 1796 g. v. 1456 g. (23% increase).

The extra fruit on the plants brought an expectation that the additional plant parts and young fruit would be a drain on the plant's system. Bolls would open sooner, but would adversely affect yield. This expectation was not realized. The treated plants grew at a faster rate and in a more healthy condition than the control.

To reduce bias, all link was then harvested by hand from the test fields including unfluffed lint from partially opened bolls. Such unfluffed lint are usually from bolls that never opened correctly and are low on the plant or from bolls just

treatment. The control rate at 1 lb. of atrazine with the bacillus was better than the control rate of 2 lb. atrazine for Bermuda grass, Dog Fennel, and Primrose, and the two treatments has the same control rate for Bull Grass. Only with Florida Pusley and 1 lb/acre of atrazine with BP01 was the control rate reduced relative to the 2 lb/acre treatment with atrazine.

Similarly, the BP01 also improved the control rate of atrazine relative to a mixture of atrazine and crop oil concentrate in all weeds except for Florida Pusley and Primrose. Such an improvement suggests that the bacillus is not acting as a surfactant, but is enhancing effectiveness by either or both of the metabolic activity or translocation characteristics of the co-applied agent.

The preceding are intended solely for purposes of illustrating the invention and are not intended to act as limitations on the scope of the appended claims.

What is claimed is:

1. A method for enhancing the effectiveness of a herbicide by applying to a plant (a) an agriculturally effective active ingredient of a plant growth stunting agent or herbicide; and (b) an enhancer selected from the group consisting of spores, cultures, or suspensions of a suitable *Bacillus* or soil bacteria.

2. The method of claim 1 wherein said agriculturally effective active ingredient and said enhancer are applied in a composition.

3. The method according to claim 1 wherein said agriculturally effective active ingredient is a triazine, glyphosate, or sulfosate.

4. The method of claim 1 wherein said enhancer contains a strain of bacteria from the genus *Bacillus*.

5. The method of claim 1 wherein said enhancer contains a strain of soil bacteria.

6. The method of claim 1 wherein said enhancer contains *B. cereus*.

7. The method of claim 1 wherein said enhancer contains *B. cereus* having a characteristic of ATCC 55675.

8. The method of claim 1 wherein said enhancer contains *B. subtilis*.

9. The method of claim 1 wherein said enhancer contains *B. subtilis* having a characteristic of ATCC 55675.

10. The method of claim 1 wherein said enhancer contains *B. megaterium*.

11. The method of claim 1 wherein said enhancer contains ATCC 55675.

12. A composition of enhancing the activity of a plant growth regulating agent comprising a suitable *Bacillus*, spore, culture and suspension thereof and a plant growth stunting agent, wherein the composition does not contain ATCC 55675.

13. The composition of claim 12 wherein said plant growth regulating agent comprises mepiquat chloride.

14. The composition of claim 12 wherein said plant growth regulating agent comprises chlorinequat chloride.

15. The composition of claim 12 wherein the *Bacillus* is a *Bacillus cereus*.

16. The composition of claim 12 wherein the *Bacillus* has a characteristic of ATCC 55675.

17. The composition of claim 12 wherein the *Bacillus* is a *Bacillus subtilis*.

18. A composition for enhancing the activity of an agriculturally effective active ingredient comprising an aqueous mixture comprising: (a) an agriculturally effective active ingredient selected from the group consisting of a plant growth regulating agent, herbicide, systemic fungicide, and a systemic insecticide; and (b) an enhancer selected from the

group consisting of spores, cultures, or suspensions of a suitable *Bacillus* or soil bacteria at a pH sufficiently less than 7 to maintain said enhancer in spore form, provided that the composition does not contain plant growth hormones when said plant growth regulating agent is a plant growth stunting agent.

19. The composition of claim 18 wherein said plant growth regulating agent comprises mepiquat chloride, chlormequat chloride, or ethephon.

20. The composition of claim 18 wherein said agriculturally effective active ingredient comprises a herbicide.

21. The composition of claim 20 wherein the herbicide is a triazine, glyphosate, or sulfosate.

22. The composition of claim 18 wherein said enhancer contains a strain of bacteria from the genus *Bacillus*.

23. The composition of claim 18 wherein said enhancer contains a strain of soil bacteria.

24. The composition of claim 18 wherein said enhancer contains a *B. cereus*.

25. The composition of claim 18 wherein said enhancer contains a *B. cereus* having a characteristic of ATCC 55675.

26. The composition of claim 18 wherein said enhancer contains a *B. subtilis*.

27. The composition of claim 18 wherein said enhancer contains a *B. subtilis* having a characteristic of ATCC 55675.

28. The composition of claim 18 wherein said enhancer contains *B. megaterium*.

29. The composition of claim 18 wherein said enhancer contains ATCC 55675.

30. A nonliquid composition comprising: a nonliquid mixture of (a) an agriculturally effective active ingredient selected from the group consisting of a plant growth stunting agent, ethephon, a plant growth hormone, naphthalenacetic acid, sodium ortho-nitrophenolate, sodium para-nitrophenolate, sodium 5-nitro-guaicolate, polyhydroxycarboxylic acids of 2, 4, 5, and 6 carbon structures, and a herbicide; and (b) an enhancer containing spores or cultures of a suitable *Bacillus* or soil bacteria, provided that the composition does not contain plant growth hormones when a plant growth stunting agent is the active ingredient.

31. The composition of claim 30 wherein said active ingredient is mepiquat chloride, chlormequat chloride, or ethephon.

32. The composition of claim 30 wherein said herbicide is glyphosate or sulfosate.

33. A method for increasing the number of fruiting sites on a fruiting plant by

- a. diluting a composition containing (a) an agriculturally effective active ingredient of a plant growth regulating agent; and (b) an enhancer containing spores of a suitable *Bacillus* or soil bacteria at a pH of less than 7 and sufficiently low to maintain said *Bacillus* in spore form, and
- b. applying the diluted composition to foliage of a plant containing fruiting sites.

34. The method of claim 33 wherein said fruiting plant is cotton.

35. The method of claim 33 wherein said plant growth regulating agent is a plant growth stunting agent or ethephon.

36. The method of claim 33 wherein said enhancer contains a strain of bacteria from the genus *Bacillus*.

37. The method of claim 33 wherein said enhancer contains a *B. cereus* having a characteristic of ATCC 55675.

38. The method of claim 33 wherein said enhancer contains a *B. subtilis* having a characteristic of ATCC 55675.

39. The method of claim 33 wherein said enhancer contains a *B. megaterium*, a *B. subtilis*, or a *B. cereus*.