

**NOTICE OF LAWSUIT AND REQUEST FOR
WAIVER OF SERVICE OF SUMMONS**

TO: (A) Ryan Shores

as (B) Attorney (C) The Scotts Miracle-Gro Company, LLC

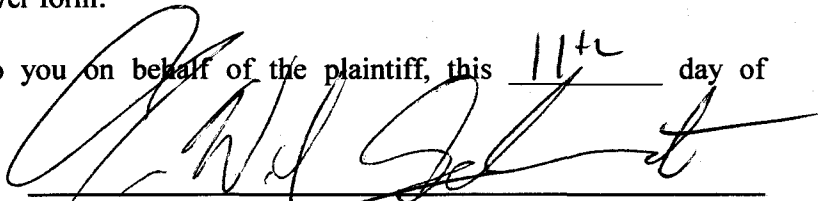
A lawsuit has been commenced against you (or the entity on whose behalf you are addressed.) A copy of the complaint is attached to this notice. It has been filed in the United States District Court for the Eastern District of Wisconsin and has been assigned docket number (E) 11-C-685

This is not a formal summons or notification from the court, but rather my request that you sign and return the enclosed waiver of service in order to save the cost of serving you with a judicial summons and an additional copy of the complaint. The cost of services will be avoided if I receive a signed copy of the waiver within (F) 30 days after the date designated below as the date on which this Notice and Request is sent. I enclose a stamped and addressed envelope (or other means of cost-free return) for your use. An extra copy of the waiver is also attached for your records.

If you comply with this request and return the signed waiver, it will be filed with the court and no summons will be served on you. The action will then proceed as if you had been served on the date the waiver is filed, except that you will not be obligated to answer the complaint before 60 days from the date designated below as the date on which this notice is sent (or before 90 days from that date if your address is not in any judicial district of the United States.)

If you do not return the signed waiver within the time indicated, I will take appropriate steps to effect formal service in a manner authorized by the Federal Rules of Civil Procedure and will then, to the extent authorized by those Rules, ask the court to require you (or the party on whose behalf you are addressed) to pay the full costs of such service. In that connection, please read the statement concerning the duty of parties to waive the service of the summons, which is set forth at the foot of the waiver form.

If I affirm that this request is being sent to you on behalf of the plaintiff, this 11th day of January, 2012



Signature of Plaintiff's Attorney
or Unrepresented Plaintiff

- A - Name of individual defendant (or name of officer or agent of corporate defendant)
- B - Title, or other relationship of individual to corporate defendant
- C - Name of corporate defendant, if any
- D - District
- E - Docket number of action
- F - Addressee must be given at least 30 days (60 days if located in foreign country) in which to return waiver.

WAIVER OF SERVICE OF SUMMONS

To: T. Wickham Schmidt
(NAME OF PLAINTIFF'S ATTORNEY OR UNREPRESENTED PLAINTIFF)

I, Ryan Shores, The Scotts Miracle-Gro Company, LLC, acknowledge receipt of your request
(DEFENDANT NAME)
that I waive service of summons in the action of ENCAP, LLC v. The Scotts Miracle-Gro Company, LLC
(CAPTION OF ACTION)
which is case number 11-C-685 in the United States District Court
(DOCKET NUMBER)

for the Eastern District of Wisconsin.

I have also received a copy of the complaint in the action, two copies of this instrument, and a means by which I can return the signed waiver to you without cost to me.

I agree to save the cost of service of a summons and an additional copy of the complaint in this lawsuit by not requiring that I (or the entity on whose behalf I am acting) be served with judicial process in the manner provided by Rule 4.

I (or the entity on whose behalf I am acting) will retain all defenses or objections to the lawsuit or to the jurisdiction or venue of the court except for objections based on a defect in the summons or in the service of the summons.

I understand that a judgment may be entered against me (or the party on whose behalf I am acting) if an answer or motion under Rule 12 is not served upon you within 60 days after January 11, 2012
(DATE REQUEST WAS SENT)
or within 90 days after that date if the request was sent outside the United States.

January 12, 2012 _____
(DATE) (SIGNATURE)

Printed/Typed Name: Ryan Shores

As Counsel of The Scotts Miracle-Gro Company, LLC
(TITLE) (CORPORATE DEFENDANT)

Duty to Avoid Unnecessary Costs of Service of Summons

Rule 4 of the Federal Rules of Civil Procedure requires certain parties to cooperate in saving unnecessary costs of service of the summons and complaint. A defendant located in the United States who, after being notified of an action and asked by a plaintiff located in the United States to waive service of summons, fails to do so will be required to bear the cost of such service unless good cause be shown for its failure to sign and return the waiver.

It is not good cause for a failure to waive service that a party believes that the complaint is unfounded, or that the action has been brought in an improper place or in a court that lacks jurisdiction over the subject matter of the action or over its person or property. A party who waives service of the summons retains all defenses and objections (except any relating to the summons or to the service of the summons), and may later object to the jurisdiction of the court or to the place where the action has been brought.

UNITED STATES DISTRICT COURT

for the

Eastern District of Wisconsin

ENCAP, LLC

Plaintiff

v.

THE SCOTTS MIRACLE-GRO COMPANY, LLC

Defendant

Civil Action No. 11-C-685

SUMMONS IN A CIVIL ACTION

To: (Defendant's name and address) THE SCOTTS MIRACLE-GRO COMPANY, LLC
14111 SCOTTS LAWN ROAD
MARYSVILLE, OH 43041

A lawsuit has been filed against you.

Within 21 days after service of this summons on you (not counting the day you received it) — or 60 days if you are the United States or a United States agency, or an officer or employee of the United States described in Fed. R. Civ. P. 12 (a)(2) or (3) — you must serve on the plaintiff an answer to the attached complaint or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff or plaintiff's attorney, whose name and address are:

T. Wickham Schmidt
Liebmann Conway Olejniczak & Jerry, S.C.
231 S. Adams Street
P.O. Box 23200
Green Bay, WI 54305-3200

If you fail to respond, judgment by default will be entered against you for the relief demanded in the complaint. You also must file your answer or motion with the court.

JON W. SANFILIPPO
CLERK OF COURT



s/ A. Wachtendonck

Signature of

Date: 07/19/2011

Civil Action No. 11-C-685

PROOF OF SERVICE

(This section should not be filed with the court unless required by Fed. R. Civ. P. 4 (l))

This summons for *(name of individual and title, if any)* _____
was received by me on *(date)* _____.

I personally served the summons on the individual at *(place)* _____
_____ on *(date)* _____ ; or

I left the summons at the individual's residence or usual place of abode with *(name)* _____
_____, a person of suitable age and discretion who resides there,
on *(date)* _____, and mailed a copy to the individual's last known address; or

I served the summons on *(name of individual)* _____, who is
designated by law to accept service of process on behalf of *(name of organization)* _____
_____ on *(date)* _____ ; or

I returned the summons unexecuted because _____ ; or

Other *(specify)*:

My fees are \$ _____ for travel and \$ _____ for services, for a total of \$ _____ 0.00 .

I declare under penalty of perjury that this information is true.

Date: _____

Server's signature

Printed name and title

Server's address

Additional information regarding attempted service, etc:

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF WISCONSIN, GREEN BAY DIVISION

-----X
ENCAP, LLC. :
 :
 : Plaintiff, :
 : :
 : v. : CASE NO. :
 : : JURY TRIAL DEMANDED :
 : :
 : THE SCOTTS COMPANY, LLC, :
 : :
 : THE SCOTTS MIRACLE-GRO COMPANY, LLC, :
 : :
 : and :
 : :
 : OMS INVESTMENTS, INC., :
 : :
 : Defendants :
 :
-----X

COMPLAINT

Plaintiff, ENCAP, LLC ("ENCAP") by and through counsel alleges and complains against Defendants, THE SCOTTS MIRACLE-GRO COMPANY, LLC, THE SCOTTS COMPANY, LLC, and OMS INVESTMENTS, INC. (collectively, "SCOTTS MIRACLE-GRO") as follows:

THE PARTIES

1. Plaintiff, ENCAP, LLC, is a company organized and existing under the laws of the State of Wisconsin, having a principal place of business at 3921 Algoma Road, Green Bay, WI 54311.
2. Upon information and belief, THE SCOTTS MIRACLE-GRO COMPANY, LLC, Defendant, is a company organized and existing under the laws of the

State of Ohio, having a principal place of business at 14111 Scotts Lawn Road, Marysville, OH 43041.

3. Upon information and belief, THE SCOTTS COMPANY, LLC, Defendant, is a company organized and existing under the laws of the State of Ohio, having a principal place of business at 14111 Scotts Lawn Road, Marysville, OH 43041.

4. Upon information and belief, OMS INVESTMENTS, INC., Defendant, is a company organized and existing under the laws of the State of Delaware, having a principal place of business at 10250 Constellation Blvd., Los Angeles, CA.

JURISDICTION AND VENUE

5. This is a civil action seeking damages, injunctive relief and attorney's fees for federal claims including patent infringement, and for state law claims including trade secret misappropriation and violation of a Confidentiality Agreement.

6. The jurisdiction of this Court over the federal claims is proper pursuant to 28 U.S.C. §1331 (federal question) and §1338 (patent). This Court has jurisdiction over the state law claims pursuant to 28 U.S.C. §1367 (supplemental), because they form part of the same case or controversy as the federal claims, and also pursuant to 28 U.S.C. §1332 (diversity), because the plaintiff is citizen of a different state than any of the defendants and the amount in controversy exceeds \$75,000. Venue is proper in this Court pursuant to 28 U.S.C. §1391 and §1400.

7. This Court has personal jurisdiction over SCOTTS MIRACLE-GRO due to its continuous and systematic business relating to its products in the state of

Wisconsin including the sale, offering for sale and/or advertisement of its products in Wisconsin.

8. The SCOTTS Company, LLC manufactures and sells "EZ Seed®" Products and "Turf Builder®" Grass Seed Products that infringe technology platform patents that ENCAP is asserting in this action. The Court has personal jurisdiction over the SCOTTS Company, LLC., because the SCOTTS Company, LLC. advertises, offers for sale and/or sells the infringing "EZ Seed®" Products and "Turf Builder®" Grass Seed Products in interstate commerce, including in the State of Wisconsin and in this District and continue to conduct this infringing activity in a continuous and systemic manner.

9. The SCOTTS Miracle-Gro Company, LLC manufactures and sells "EZ Seed®" Products and "Turf Builder®" Grass Seed Products that infringe technology platform patents that ENCAP is asserting in this action. The Court has personal jurisdiction over the SCOTTS Miracle-Gro Company, LLC., because the SCOTTS Miracle-Gro Company, LLC. advertises, offers for sale and/or sells the infringing "EZ Seed®" Products and "Turf Builder®" Grass Seed Products in interstate commerce, including in the State of Wisconsin and in this District and continue to conduct this infringing activity in a continuous and systemic manner.

10. OMS Investments, Inc. directs the manufacture, offer for sale, sale, and licensing of the "EZ Seed®" Products, and "Turf Builder®" Grass Seed Products that infringe technology platform patents that ENCAP is asserting in this action. This Court has personal jurisdiction over OMS Investments, Inc. because OMS Investments, Inc. directs the offer for sale and sale of the "EZ Seed®" Products, and "Turf Builder®"

Grass Seed Products, in interstate commerce, including in the state of Wisconsin and in this district and continue to conduct this infringing activity in a continuous and systemic manner.

BACKGROUND

11. U.S. Patent, 6,209,259 ("the '259 patent") was issued on April 3, 2001 from application Serial No. 09/113,254 filed on July 10, 1998, entitled SEEDING TREATMENTS. The patent for this platform technology is assigned to ENCAP, LLC through an assignment dated July 12, 2000 and recorded at the United States Patent and Trademark Office at Reel 011258, Frame 0827. A true and correct copy of the '259 patent is annexed hereto as Exhibit 1.

12. U.S. Patent 7,412,878 ("the '878 patent") was issued on August 19, 2008 from application Serial No. 10/841,204 filed on May 6, 2004, entitled WATERING INDICATOR. The patent for this platform technology is assigned to ENCAP, LLC through assignments dated May 6, 2004 and recorded at the United States Patent and Trademark Office at Reel 015313, Frame 0691. A true and correct copy of the '878 patent is annexed hereto as Exhibit 2.

13. U.S. Patent 6,745,513 ("the '513 patent") was issued on June 8, 2004 from application Serial No. 09/821,128 filed on March 29, 2001, entitled AGGLOMERATED MULCH CARRIER. The patent for this platform technology is assigned to ENCAP, LLC through assignments dated March 23, 2001 and recorded at the United States Patent and Trademark Office at Reel 011673, Frame 0105. A true and correct copy of the '513 patent is annexed hereto as Exhibit 3.

14. ENCAP has invented and patented many novel platform technologies in the seed, mulch, water management, soil conditioners and fertilizer industries. ENCAP has expended millions of dollars in research and development and legal costs to develop and protect these platform technologies. ENCAP is a marketer of products in the Consumer and Commercial Lawn and Garden Industry, selling seed, mulch, fertilizer (and combinations thereof), water management, soil conditioning and related products based on these platform technologies.

15. In early 2002, Personnel from The SCOTT'S Company, LLC and SCOTT'S Miracle-Gro Company, LLC, including Directors of Marketing, Production Managers, Brand Managers, Research and Development, and the Manager of the "Patch Master®" Product Line had several introductory confidential communications with persons at ENCAP, prior to the Confidential Information Memorandum being sent to and received by The SCOTT'S Company, LLC and SCOTT'S Miracle-Gro, LLC, inquiring about ENCAP's platform technologies and whether they were protected by any patents. The SCOTT'S Company, LLC and SCOTT'S Miracle-Gro Company, LLC were interested to know how the seed coating in ENCAP's encapsulated seed technology absorbed water.

16. Personnel from The SCOTT'S Company, LLC and SCOTT'S Miracle-Gro Company, LLC stated to ENCAP at that time that they recognized the benefits of ENCAP's products and related platform technologies over the pelleted mulch products in reducing seed segregation. SCOTT'S representatives further stated that they were interested in exploring the possibility of having a premium line of seed, mulch and fertilizer patch products. SCOTT'S representatives also stated that ENCAP's Grass Repair

Kit is a patch type product that offers many advantages over the puffy-bag and pellet products at that time.

17. Shortly thereafter, ENCAP sent to The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC at The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC request, cases of ENCAP's Grass Repair Kit, and ENCAP's Mulch and Encapsulated Seed Products that were representative of ENCAP's platform technology. The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC stated that they were going to test these products.

18. In June of 2002, ENCAP, through its agents, Transactive Partners, Ltd., sent to The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC, a Confidential Information Memorandum. On the second page of the document, it was stated that the recipient of the Confidential Information Memorandum, The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC, agrees herein, in consideration for the receipt of this document, not to reproduce, copy, use or transmit this document or the data contained herein, in whole or part, or to suffer such action by others for any other purpose except with written permission of Transactive Partners Ltd.

19. The Confidential Information Memorandum stated that ENCAP had recently developed and protected innovative platform technologies in the horticultural and agricultural markets. ENCAP disclosed the problems and shortcomings related to the current product technologies offered at the time, and how ENCAP's platform technologies and products were developed to be a novel and innovative solution to them.

20. The Confidential Information Memorandum stated that in all cases, the platform technologies were intended to make life easier for both the consumer and the seed. SCOTTS MIRACLE-GRO called their current product, EZ Seed.

21. One such innovative platform technology discussed is the process that allows ENCAP to encapsulate individual seeds with the precise amount of nutrients, conditioners, and mulch required to enhance the seeds' ability to survive and thrive. The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC were told at this time that this technology was patented. (US Patent 6,209,259).

22. ENCAP further disclosed its mulch technologies, which combine various mulching agents, soil conditioners, watering indicators (part of a pending patent application owned by ENCAP), asymmetric, interlocking granules for use as a seed cover and/or seed carrier. (US Patent 6,745,513).

23. ENCAP disclosed to The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC the ideas behind ENCAP's encapsulated seed platform technology, which included creating a protective moisture-absorbing blanket that is around each seed. The moisture-absorbing blanket enhances the germination and establishment process by absorbing and holding water around each seed. Water softens and swells the seed. The seed encapsulation absorbs/retains dramatically more moisture than normal, un-encapsulated turf seed. ENCAP's encapsulated seed was also shown by university studies to outperform the establishment of untreated seeds.

24. ENCAP also provided confidential information to The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC regarding the use of the color of

the mulch as a watering indicator as taught in its platform technology. ENCAP disclosed to The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC that watering practices by consumers require the help of watering platform technologies to help the consumer know when, and how long, to water. The mulch is a light color when dry and a dark color when wet.

25. ENCAP specifically referred to one of its watering platform technologies (Water-Me-Technology) as "THE SMART PRODUCT". This technology helps tell the consumer when watering is needed based on a visual color indicator to the consumer. Five years after ENCAP disclosed these concepts to SCOTTS MIRACLE-GRO, SCOTTS MIRACLE-GRO trademarked the name WATER SMART in association with their soil amendments, fertilizer, and grass seed products.

26. ENCAP also provided confidential information to The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC regarding the use of a product that changes size to indicate when watering is needed. This watering indicator platform technology taught how a mulch product can be watered until a specific size change (increase) occurred.

27. It was specifically stated by ENCAP in the Confidential Information Memorandum to The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC that the Encapsulated Seed platform technology was patented. It was also stated to The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC that the Agglomerated Mulch Carrier platform technology was patent pending and that the Colored or Fragrance Horticultural/Agricultural platform technology was patent pending.

28. Transactive Partners received a signed a Confidentiality Agreement in June of 2002 on behalf of The SCOTTTS Company, LLC and SCOTTTS Miracle-Gro Company, LLC prior to Transactive Partners disclosing any of its confidential information to The SCOTTTS Company, LLC and SCOTTTS Miracle-Gro Company, LLC on ENCAP's behalf.

29. In 2006, Wisconsin Governor Jim Doyle honored ENCAP with the Governor's Small Business Technology Transfer Award for outstanding achievement moving a technological innovation from idea to commercialization. The award acknowledges ENCAP's unique technology platforms and innovation advancement business model and its successful results. In November 2006, the Green Bay Chamber of Commerce awarded ENCAP its High Technology Manufacturer of the Year Award recognizing ENCAP for its innovative technology platforms. In 2007, ENCAP was named number 110 in Inc. Magazine's prestigious "Inc. 500 list," which charts America's fastest growing privately held companies based, on sales growth of ENCAP's platform technology products.

30. During the initial discussions between The SCOTTTS Company, LLC and SCOTTTS Miracle-Gro Company, LLC and ENCAP in 2002, ENCAP provided its Grass Repair Kit to The SCOTTTS Company, LLC and SCOTTTS Miracle-Gro Company, LLC. The Grass Repair Kit included mulch and seed in combination. SCOTTTS currently is selling the "Patchmaster®" Lawn Repair Mix and Evergreen Lawn Repair Kit. Sellers and

distributors of the SCOTTS Patchmaster Lawn Repair Mix and Evergreen Lawn Repair Kit products have been referring to this product as a "Repair Kit", which is a trademark of ENCAP.

31. ENCAP is known and recognized by Lawn and Garden industry leaders for its innovative expertise and problem solving abilities.

FIRST CAUSE OF ACTION (PATENT INFRINGEMENT)

32. Plaintiff, ENCAP hereby incorporates paragraphs 1-31 as if fully set forth herein.

33. SCOTTS MIRACLE-GRO has been, is, and will continue infringing ENCAP's '513 patent through its unauthorized manufacture, use, offers for sale and sales of its "EZ Seed®" products and Miracle-Gro "Patch Magic" products and threatens to, and will continue to, infringe the '513 patent, causing ENCAP great and irreparable injury and damage unless enjoined by this Court, said infringement being without consent of ENCAP.

34. SCOTTS MIRACLE-GRO's actions constitute a deliberate and willful infringement of U.S. Patent 6,745,513 and will continue unless enjoined by this Court.

35. ENCAP has worked to improve and has improved the seed, mulch and fertilizer industry by designing, manufacturing and distributing innovative products and patenting the related platform technologies which help the environment with the use of an agglomerated/granulated mulch product as a seed carrier that is produced by an agglomeration technology. The mulch agglomerates used as a carrier for the seeds reduces segregation (unmixing) tendencies of seeds from the carrier product.

SECOND CAUSE OF ACTION (PATENT INFRINGEMENT)

36. Plaintiff, ENCAP hereby incorporates paragraphs 1-35 as if fully set forth herein.

37. SCOTTS MIRACLE-GRO has been, is, and will continue infringing ENCAP's '878 patent through its unauthorized manufacture, use, offers for sale and sales of its "EZ Seed®" products and Miracle-Gro "Patch Magic" products and threatens to, and will continue to, infringe the '878 patent, causing ENCAP great and irreparable injury and damage unless enjoined by this Court, said infringement being without consent of ENCAP.

38. SCOTTS MIRACLE GRO's actions constitute a deliberate and willful infringement of U.S. Patent 7,412,878 and will continue unless enjoined by this Court.

39. ENCAP has worked to improve and has improved the seed, mulch and fertilizer industry by designing, manufacturing and distributing products which help the environment with the use of water absorbing/releasing materials (Indicators) to serve as the visual indicators for people to know when they are to start and stop watering their lawn.

THIRD CAUSE OF ACTION (PATENT INFRINGEMENT)

40. Plaintiff, ENCAP hereby incorporates paragraphs 1-39 as if fully set forth herein.

41. SCOTTS MIRACLE-GRO has been, is, and will continue infringing ENCAP's '259 patent through its unauthorized manufacture, use, offers for sale and sales of its Turf Builder® Grass Seed Products and threatens to, and will continue to

infringe the '259 patent, causing ENCAP great and irreparable injury and damage unless enjoined by this Court, said infringement being without consent of ENCAP.

42. SCOTTS MIRACLE-GRO's actions constitute a deliberate and willful infringement of U.S. Patent 6,209,259 and will continue unless enjoined by this Court.

43. ENCAP has worked to improve and has improved the seed, mulch and fertilizer industry by designing, manufacturing and distributing products which help the environment, by enhancing the control of moisture about the seed and thereby to assist in seed germination, release of plant nutrients into the soil, and in stabilizing moisture content in soil on which the encapsulated seed is placed.

FOURTH CAUSE OF ACTION
(MISAPPROPRIATION OF TRADE SECRETS)

44. Plaintiff, ENCAP hereby incorporates paragraphs 1-43 as if fully set forth herein.

45. ENCAP took reasonable efforts to maintain the Confidential Information described in the Confidential Information Memorandum and in conversations with The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC as a trade secret.

46. The information provided in the Confidential Information Memorandum and related conversations with The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC regarding the encapsulated seed, mulch and watering technologies was not generally known to the public.

47. The information provided in the Confidential Information Memorandum and related conversations with The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC regarding the encapsulated seed, mulch and watering technologies conferred an economic benefit to ENCAP.

48. SCOTTS MIRACLE-GRO never had permission to use any of the information that was provided to it by ENCAP through Transactive Partners.

49. Nearly seven years after The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC received ENCAP's confidential and trade secret information, SCOTTS MIRACLE-GRO came out with its "EZ Seed®" Products, Miracle-Gro "Patch Magic" Products and "Turf Builder®" Grass Seed Products which upon information and belief use information which was provided to The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC under confidentiality from ENCAP.

50. The last communication from The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC to ENCAP was on September 30, 2002 when The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC told ENCAP they were running test plots and then they would do consumer testing.

51. In 2009, SCOTTS MIRACLE-GRO began selling its "Turf Builder®" Grass Seed with Water Smart Technology. Upon information and belief, and after a reasonable investigation, SCOTTS Water Smart Technology is the same or highly similar technology that ENCAP disclosed to The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC under confidentiality. Specifically, SCOTTS MIRACLE-GRO encapsulated their best seed in an absorbent coating that helps the seed to stay moist

and germinate faster than uncoated seeds. SCOTTS MIRACLE-GRO stated in their literature that 50% of grass seed users told them that they were not successful at growing grass because they didn't water frequently enough. SCOTTS MIRACLE-GRO stated that they listened to their consumers and came up with a solution. They wrapped their best seed in a super absorbing coating that helps seed to stay moist and germinate faster than uncoated seed. In reality, SCOTTS MIRACLE-GRO misappropriated this solution from ENCAP's confidential technology.

52. The Chief Financial Officer of SCOTTS MIRACLE-GRO, Dave Evans, stated at Oppenheimer's Ninth Annual Conference that the Turf Builder® Grass Seed with Water Smart Technology was "game changing innovation".

53. SCOTTS MIRACLE-GRO calls their SCOTTS Turf Builder® Grass Seed product "revolutionary".

54. In the 2010 SCOTTS MIRACLE-GRO Annual Report, it states the introduction of EZ SEED® marked SCOTTS MIRACLE-GRO's most successful new product launch ever.

55. SCOTTS MIRACLE-GRO misappropriated ENCAP's trade secrets under Wisconsin's Uniform Trade Secret Act, Wis. Stats. §134.90 that were in the Confidential Information Memorandum and disclosed to The SCOTTS Company, LLC and SCOTTS Miracle-Gro Company, LLC through conversations with Transactive Partners Ltd.

56. SCOTTS MIRACLE-GRO was unjustly enriched by using ENCAP's trade secrets and ENCAP is entitled to all of SCOTTS MIRACLE-GRO's profits from its use of the trade secrets.

WHEREFORE, ENCAP prays for the following relief:

A. That United States Patents 6,745,513, 7,412,878, and 6,209,259 be adjudged valid and enforceable;

B. That SCOTTS MIRACLE-GRO be adjudged to have infringed United States Patents 6,745,513, 7,412,878, and 6,209,259 ;

C. That SCOTTS MIRACLE-GRO's acts of infringement be adjudged to be willful and deliberate;

D. That SCOTTS MIRACLE-GRO, its officers, agents, servants, employees and attorneys and any and all persons in active concert or participation with them be preliminarily and permanently enjoined and restrained from infringing United States Patents 6,745,513, 7,412,878, and 6,209,259, including but not limited to by making, using, offering for sale and selling "EZ Seed®" Products, Miracle-Gro "Patch Magic" products and "Turf Builder®" Grass Seed Products;

E. That SCOTTS MIRACLE-GRO be ordered to account for and pay to ENCAP the damage sustained by ENCAP due to SCOTTS MIRACLE-GRO's infringement of United States Patents 6,745,513, 7,412,878, and 6,209,259;

F. That SCOTTS MIRACLE-GRO be ordered to pay pre-judgment and post-judgment interest on the damages awarded against it;

- G. That SCOTTS MIRACLE-GRO be ordered to account for and pay to ENCAP any profits or royalties for any conveyed sales of products;
- H. That ENCAP be awarded its costs and attorney's fees pursuant to 35 U.S.C. §285;
- I. An Order directing SCOTTS MIRACLE-GRO to deliver up to the Court for disposition all product and all advertising and promotional materials that are in violation of ENCAP's rights;
- J. An award to ENCAP of SCOTTS MIRACLE-GRO's profits and ENCAP's damages;
- K. A trebling of the damages and profits awarded to ENCAP on account of SCOTTS MIRACLE-GRO's willful infringement of ENCAP's patents;
- L. An award to ENCAP of such punitive damages as are appropriate in view of the willful conduct on the part of SCOTTS MIRACLE-GRO;
- M. That ENCAP be adjudged to have trade secrets;
- N. That SCOTTS MIRACLE-GRO be found to have misappropriated ENCAP's trade secrets;
- O. An award to ENCAP for unjust enrichment for SCOTTS MIRACLE-GRO's use of ENCAP's trade secrets;
- P. That SCOTTS MIRACLE-GRO's misappropriation of trade secrets be found to be willful and malicious and that ENCAP be awarded punitive damages in an amount not exceeding twice any compensatory award received by ENCAP for that misappropriation;

Q. An award to ENCAP of its costs in this action including its reasonable attorneys fees; and

R. Such other and further relief as the Court may deem just and equitable under the circumstances herein.

Dated this 18th day of July, 2011.

Respectfully submitted,

s/T. Wickham Schmidt

T. Wickham Schmidt, State Bar No. 1062002
Liebmann, Conway, Olejniczak & Jerry, S.C.
Attorneys and Counselors at Law
231 South Adams Street
Green Bay, WI 54305-3200
TELEPHONE: (920) 437-0476
FACSIMILE: (920) 437-2868

Philip M. Weiss (PW 4505)
WEISS & WEISS
300 Old Country Road, Suite 251
Mineola, NY 11501
TELEPHONE: (516) 739-1500

Aaron Olejniczak, State Bar No. 1034997
Andrus, Sceales, Starke & Sawall, LLP
100 East Wisconsin Ave, Suite 1100
Milwaukee, WI 53202
TELEPHONE: (414) 271-7590
FACSIMILE: (414) 271-5770

Attorneys for Plaintiff

(071109.101-#1028710)

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

(10) Patent No.: **US 6,209,259 B1**
 (45) Date of Patent: **Apr. 3, 2001**

(54) **SEEDING TREATMENTS**

(75) Inventors: **Daniel Paul Madigan; Michael Dennis Krysiak; Ronald Dean Eichhorn; Glen H. Wesenberg**, all of Green Bay, WI (US)

(73) Assignee: **Encap, LLC, Green Bay, WI (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.: **09/113,254**

(22) Filed: **Jul. 10, 1998**

Related U.S. Application Data

(60) Provisional application No. 60/052,287, filed on Jul. 11, 1997.

(51) Int. Cl.⁷ **A01K 1/06; A01K 21/00**

(52) U.S. Cl. **47/57.6; 47/58.1**

(58) Field of Search **47/65, 65.5, 74, 47/57.6, 58.1**

(56) **References Cited**

U.S. PATENT DOCUMENTS

56,140	7/1866	Blessing .	
2,664,350	12/1953	Hale et al.	71/1
3,269,824 *	8/1966	Aswell	47/57.6
3,545,129	12/1970	Schreiber et al.	47/57.6
3,621,612	11/1971	Porter	47/58
3,698,133 *	10/1972	Schreiber	47/57.6
3,905,152 *	9/1975	Loperfido	47/57.6
3,936,976	2/1976	Porter et al.	47/57.6
3,947,996	4/1976	Watts	47/57.6
3,950,891	4/1976	Hinkes	47/57.6
4,065,287 *	12/1977	Roth	71/13
4,116,666	9/1978	Willard, Sr.	71/77
4,192,095	3/1980	Haslam et al.	47/58
4,272,417	6/1981	Barke et al.	260/22 R
4,344,979	8/1982	Gago et al.	427/4
4,438,593	3/1984	McNew et al.	47/57.6
4,452,008	6/1984	Sandhu et al.	47/57.6
4,493,162	1/1985	Langan et al.	47/57.6
4,628,633 *	12/1986	Nilsson	47/57.6
4,752,319	6/1988	DelliColli	71/77
4,759,151 *	7/1988	Gerber	47/57.6
5,044,116	9/1991	Gago et al.	47/57.6
5,087,475	2/1992	Bazin et al.	427/4
5,106,648	4/1992	Williams	427/3
5,127,185	7/1992	Kojimoto et al.	47/57.6
5,300,127	4/1994	Williams	473/57.6
5,368,626	11/1994	Schnuda	71/23

5,525,131	6/1996	Asano	47/57.6
5,623,781	4/1997	Legro	47/57.6
5,627,133 *	5/1997	Nelson	504/116

FOREIGN PATENT DOCUMENTS

2354101 5/1974 (DE) **A01C7/00**

OTHER PUBLICATIONS

Biology of Plants, Raven et al., Worth Publishers, p. 596, 1992.*

Hovmand, Granulation and agglomeration by fluidized bed and spray drying technology, pp. 1, 10-11, 1982.*

Briquetting, pelletizing, extrusion & fluid bed/spray granulation, table of contents, table 8-52, 1998.*

Perry' Chemical Engineers' Handbook, 8-61, 1978.*

Briquetting, Pelletizing, Extrusion and Fluid Bed/Spray Granulation, Engelleitner, tables 23-24, p. 21 and 23, 1998.*

Pietsch, Wolfgang, "Part 2. Agglomerate Bonding and Strength," Date unknown. (Reprinted from W. Pietsch (98)).

Staub-Reinhalt, Luft, "Part 3, The Agglomerative Behavior of Fine Particles," (Reprinted from W. Pietsch (7), English edition), vol. 27, No. 1, Jan. 1967.

* cited by examiner

Primary Examiner—Bruce R. Campbell

Assistant Examiner—Anne Marie Grünberg

(74) *Attorney, Agent, or Firm*—Philip M. Weiss, Esq.; Weiss and Weiss PC

* cited by examiner

Primary Examiner—Bruce R. Campbell

Assistant Examiner—Anne Marie Grünberg

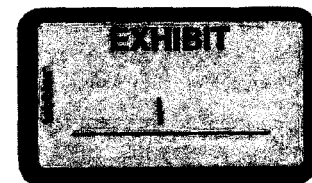
(74) *Attorney, Agent, or Firm*—Philip M. Weiss, Esq.; Weiss and Weiss PC

* cited by examiner

(57) **ABSTRACT**

This invention pertains to combination seed capsules wherein each seed capsule includes both moieties of at least one soil conditioner and at least one seed, and optionally, one or more inorganic chemical fertilizer, growth enhancer, binder, and/or anti-fungal agent. The combination seed capsules are made by physically combining the respective soil conditioner and seed with one other, in the absence of any requirement for chemical reactions in the process of so combining the respective materials. The combination seed capsules provide cooperative and beneficial effects of the soil conditioner and the optional inorganic fertilizer, working together in controlled intimate relation with the seed, to enhance the germination and growth processes of the seed, and the plant emergent therefrom, greater than when the soil conditioner and seed, and optionally inorganic chemical fertilizer, are applied to the soil separately; the improvement being a result of the intimate relationship of the respective materials in the combination seed capsule, whereby the respective materials cooperate with each other in support of germination and plant growth.

14 Claims, 6 Drawing Sheets



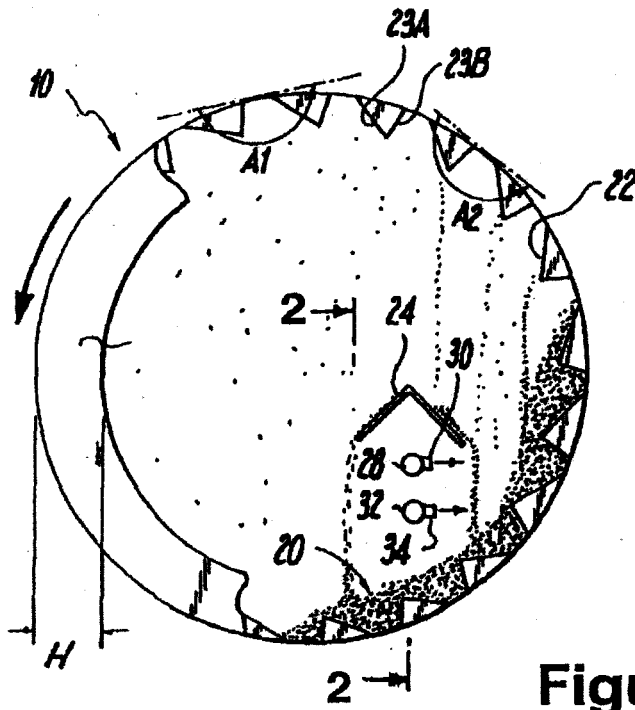


Figure 1

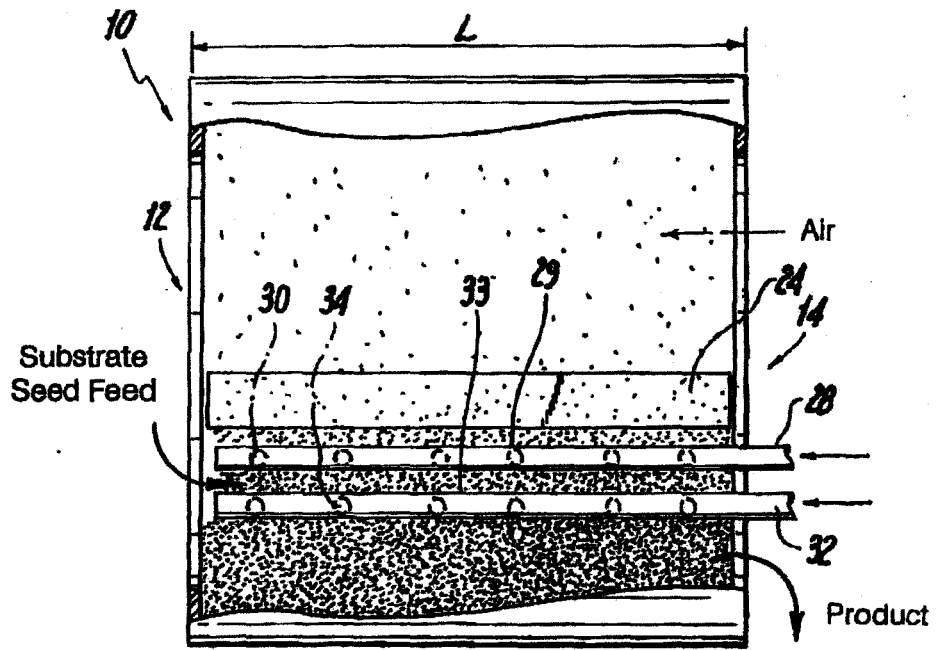
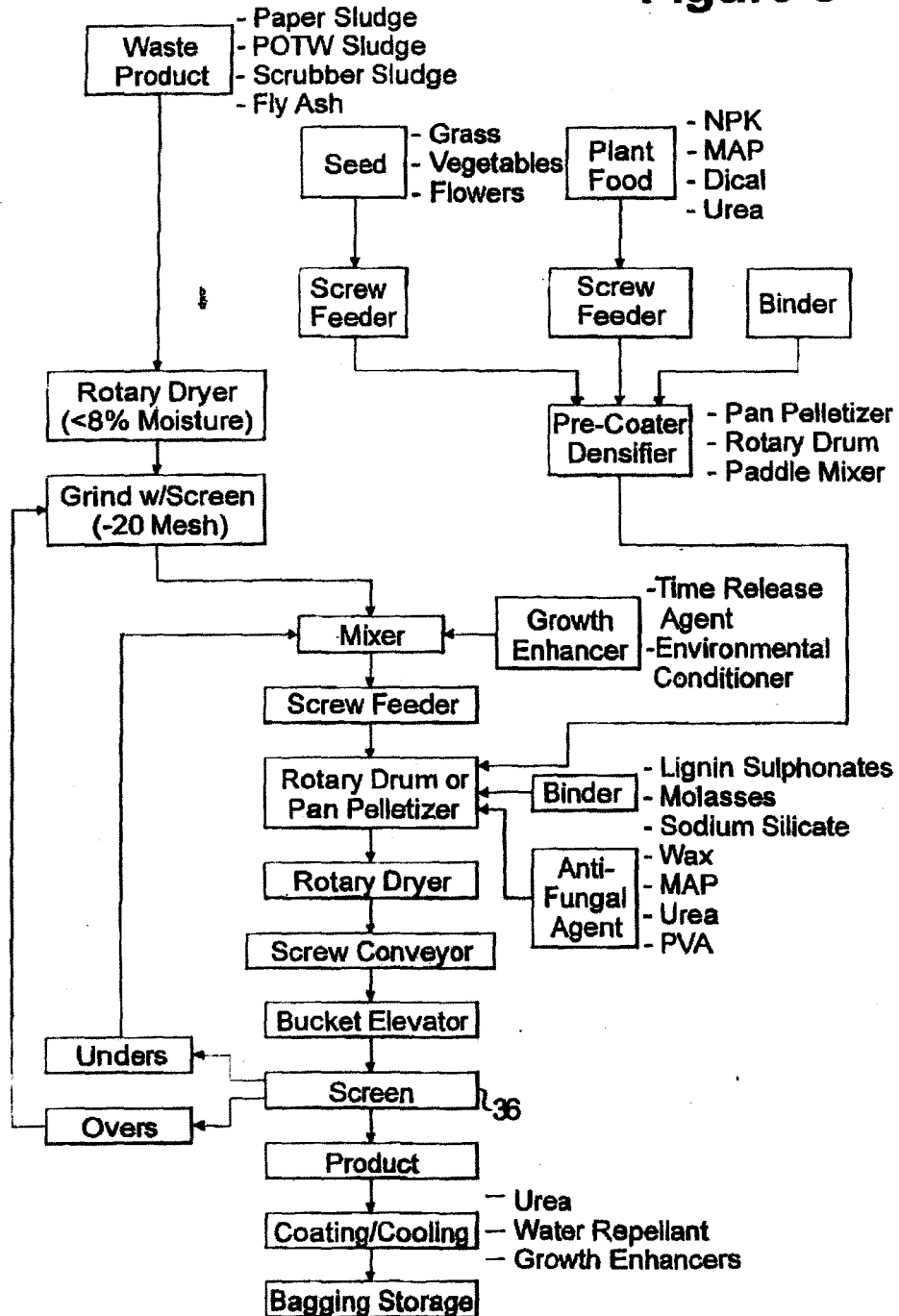


Figure 2

Figure 3



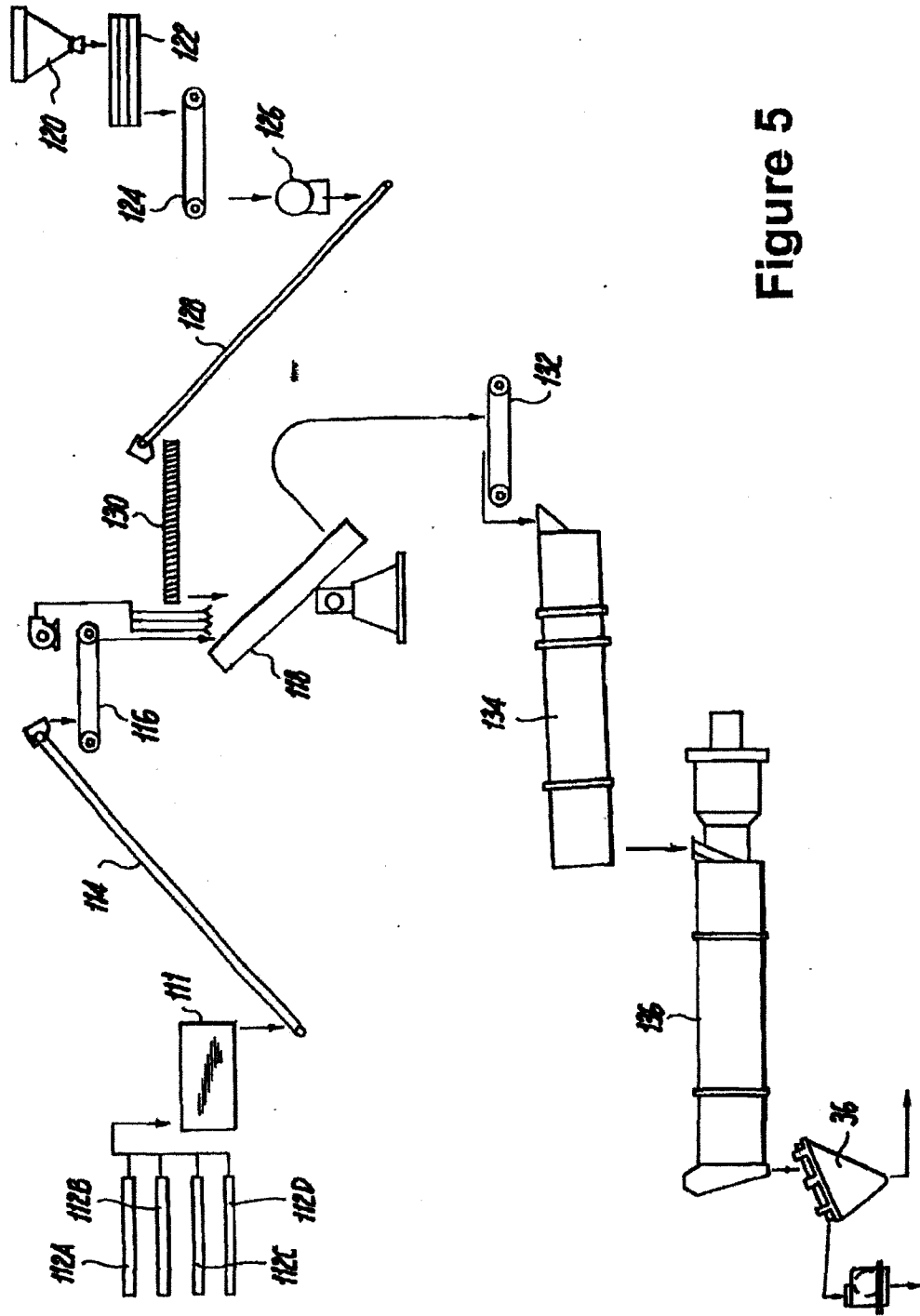


Figure 5

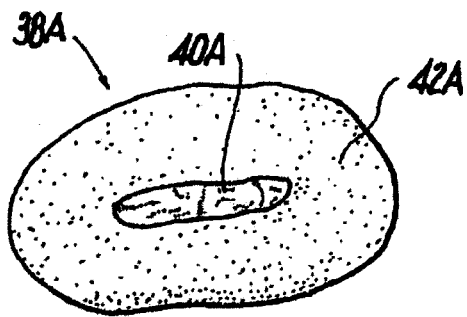


Figure 6A

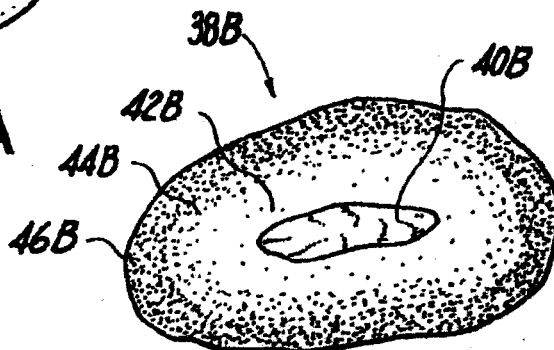


Figure 6B

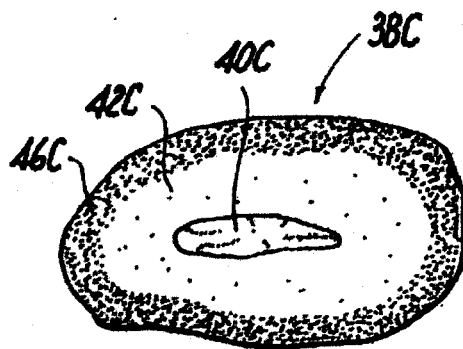


Figure 6C

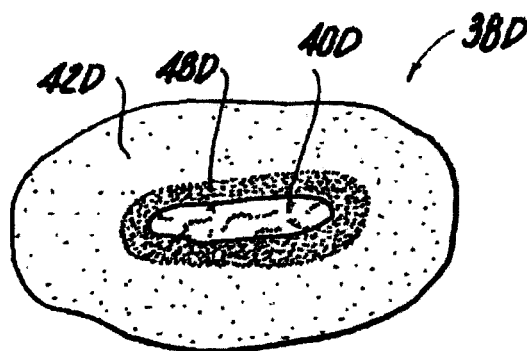


Figure 6D

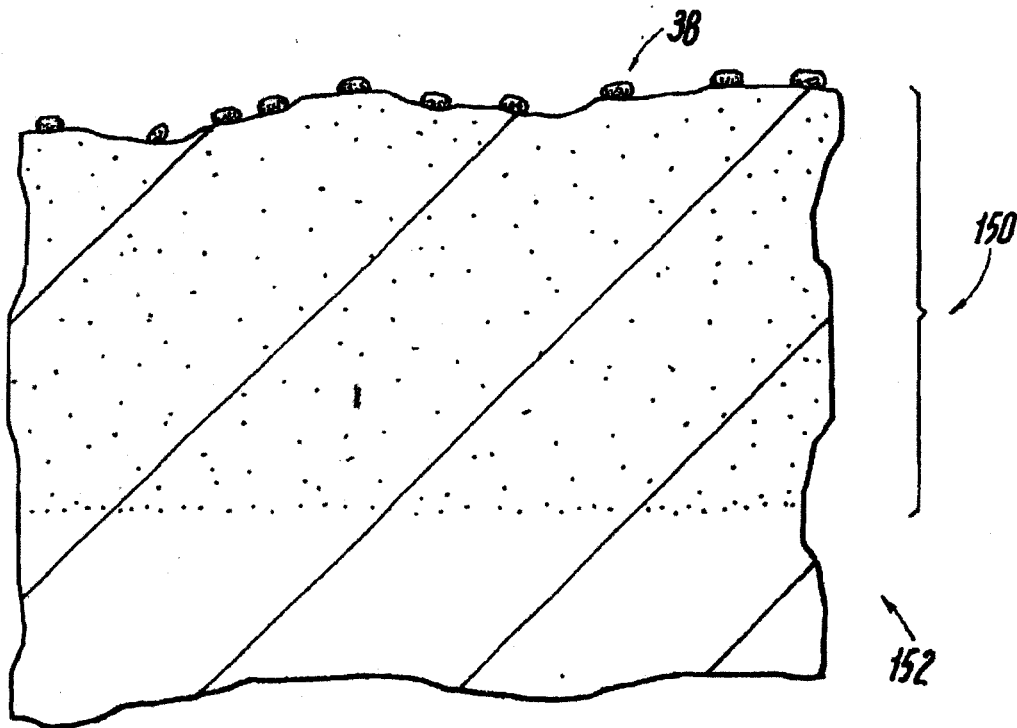


Figure 7

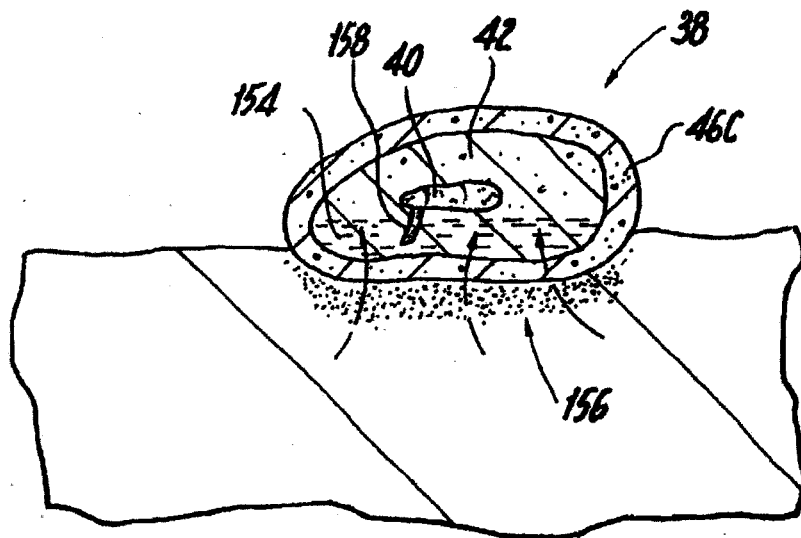


Figure 8

SEEDING TREATMENTS

This application claims benefit to U.S. provisional No. 60/052,287 filed Jul. 11, 1997.

FIELD OF THE INVENTION

This present invention relates to improvements in seed and seed-related products, processes for making such products and processes for establishing and improving seed beds and seed bed germination. As additional benefits, this invention is directed at improving soil productivity through enhancements in soil fertility, soil condition/tilth, and control of soil moisture. Further, the invention relates to productive use of certain types of abundantly available manufacturing waste, which waste is currently being disposed of in landfills.

BACKGROUND OF THE INVENTION

Agricultural growers, gardeners, landscape operators, flower growers, and the like produce a wide variety of cultivated crops. Many such crops are grown from seed. The sizes, shapes, and physical characteristics of the various kinds of seeds are as varied as the number of crops produced therefrom.

Producers of such cultivated crops encounter a variety of challenges in handling and distributing such seed, as well as with sowing of such seed in suitable growing media. Certain seed may desirably be sowed by a broadcast method if the seed were compatible with broadcast application. For example, grass seed for lawns is desirably broadcast, but the low density and generally non-aerodynamic shape of some grass seed can limit the range of such broadcast, and make such seed susceptible to being blown about by wind, or washed away by surface water, even if initially well placed in a good seeding application.

Another difficulty encountered in sowing seed is that the seed may be so small as to be difficult to handle, thereby to place properly-spaced seeds at a desired spacing as to make cost-effective use of the seed, thereby to produce a crop of the related plants without using any more seed than necessary, thus to gain maximum benefit from the amount of seed used.

While small seed may be efficiently handled by industrial equipment especially designed for handling such seed, typically the user of such seed also handles various other types of seed; and may be unable to justify the cost of such specialty seed-handling equipment. Rather, the seed user typically has a limited range of seed handling equipment which must be capable of being used and/or adapted to handle and apply all the types of seeds being used by that user. Where the seed itself can be adapted to the equipment, specialty seed can be handled without need for any specialized equipment.

Even where the seed may be sown by hand, such as in seedling or bedding trays or pots, some seeds are so small as to be difficult for the sower/user to effectively manipulate and control by hand. Typical of such difficult-to-handle seeds are seeds of lettuce, carrots, the cabbage family, ground cherries, and alfalfa. Many flower seeds are equally small and/or difficult to handle and/or manipulate, for example poppy seed.

When seed is planted, the seed has immediate use for moisture to aid in germination of the seed, and subsequent early development of the resulting young plant. Where moisture is not readily available to the seed when planted,

the seed may lie in a dormant state for some period of time before germinating. While the seed is thus dormant, awaiting suitable moisture, the seed is subject to a variety of hazards which may destroy its viability. The seed may be attacked by worms, parasites, and other pests. The seed may be eaten by foraging animals including insects and larvae. The seed may be overheated by a hot sun. The seed may lie dormant without germinating for so long that any plant emerging therefrom will have insufficient time to mature before the end of the growing season.

If and when the seed does germinate, the seedling plant has a continuing need for a proper balance of moisture and oxygen, as well as for such plant nutrients as nitrogen, phosphorous, and potash, as well as the micronutrients, in relatively predictable quantities. To the extent the proper balance of such materials is available to the young plant, a healthy young plant may be produced, with optimum potential for maximum crop production, assuming germination occurs at a seasonably-desirable time.

To the extent one or more such materials is not available to the seed and/or the young plant, plant growth, plant health, and ultimately maturity, may be adversely affected. For example, the soil may be too dry to support germination, or optimum germination. Or while the soil may in general have a desired moisture content, moisture content at a macro level can vary widely. Thus, while the soil in general may have a desirable moisture content, the microcosm of the soil adjacent an individual seed may be too dry, or too wet, to support any germination, or optimum germination.

Similarly, the soil may be generally depleted of one or more plant nutrients needed by the germinated seedling. Or while the soil may in general have desired nutrient levels, the nutrient levels at a macro level can vary widely. Thus, the microcosm of the soil adjacent an individual seed may be too low in one or more nutrients to support a desired level of plant growth, or so high as to be toxic to a desired level of plant growth.

Further, plant nutrient chemicals may be present in the soil, but so tied up chemically in the soil as to be unavailable, or poorly available, relative to the quantities and use rates needed for desired plant growth. Or the soil may become so hard, dry, and/or caked shortly after the seed germinates that the seedling plant has difficulty penetrating such soil, difficulty becoming associated suitable nutrients, and/or difficulty taking up such nutrients because of insufficient moisture availability.

After the plant has further developed such that the plant roots extend deeper into the soil, conditions of the soil near the surface are less critical. However, until such time as the roots so penetrate, conditions of the soil at and near the top surface of the soil may be critical.

Soil fertility generally relates to uptake of plant nutrients from the soil by plants. Uptake is generally the result of two factors, the presence of plant nutrients in the soil, and the availability of the plant nutrients for plant uptake. Presence of plant nutrients in the soil is generally a function of the combination of (a) the basic level of soil fertility, (b) depletion by previous crop production and (c) replenishment with fertilizer. Availability of a plant nutrient physically present in the soil for plant uptake is in general related to solubility of the respective nutrient or nutrient combination in a solvent for the nutrient, which solvent is present in the soil, such solvent as water, along with any other material affecting solvation of the plant nutrient into the water or other solvent.

Plant nutrients are routinely depleted from the soil by crop production, and are routinely added back, or otherwise replenished, to the soil by conventional inorganic fertilizers.

3

In order for plant nutrients in the soil to be available for uptake by plants, the nutrients must be held in the soil without excessive leaching, but must not be held so tightly that the nutrients cannot be released for plant uptake. Thus, nutrient availability requires a balance between holding tightly enough to retain the nutrient in the root zone, without leaching, but not so tight as to make the nutrient unavailable for plant uptake. Thus, the general "condition" or "tilth" of the soil is instrumental in determining the efficiency with which plant nutrients are utilized for plant nutrition.

A properly conditioned soil has advantageous soil chemistry in combination with advantageous soil texture. Thus, in addition to providing specific plant nutrients, soil users also use products that modify basic soil chemistry, and soil texture.

Basic soil chemistry is modified by adding to the soil, for example, calcium products to provide pH control, and flyash or like products to provide pH control as well as micronutrients.

Soil texture is generally modified by adding to the soil organic matter such as manures, sludges, wood and other plant products and by-products, and the like. While such materials have good soil conditioning properties, plant nutrient value of such materials is fixed and is generally so low that other "fertilizer"-type products must in general be used in addition to the organic matter in order to preserve plant nutrient values in the soil.

The primary object of this invention is to provide solid plant seed capsule products that supply both soil conditioning properties and the seed, which can benefit from such conditioned soil, in a given seed capsule particle.

It is a further object to provide a plant nutrient material, in the seed capsule particle, in amount beneficial to the seedling emerging from the seed, and higher than a naturally-occurring amount of such nutrient in such soil conditioning material, so as to have enhanced chemical nutrient qualities over use of the soil conditioning material alone.

In another aspect, a further object is to provide soil conditioning and optionally nutrient qualities to seed products that reach the soil as the result of fulfilling objectives separate from providing soil fertility or soil conditioning.

Still another object is to provide seed capsules containing fertility-enhancing elements having a high level of plant food nutrients in combination with a high level of soil conditioning properties.

Still another object is to encapsulate a seed in a soil conditioning material using materials rich in plant nutrients as part of the encapsulating agent.

Yet another object is to provide a seed product which reduces the tendency for light weight seeds to be washed away by surface water runoff.

Still another object is to provide a seed product which obviates the typical practice of adding straw as a mulch over e.g. grass seed, to protect the seed from being washed away by surface water, from heat of the sun, and to hold moisture in the soil.

A further object is to provide products wherein a single seed capsule product particle provides enhanced soil texture and enhanced soil nutrient value at nutrient levels traditionally needed by newly-germinated seedlings, optionally with higher levels of plant nutrient suitably spaced from the seed itself so as to not be toxic to seedling growth, optionally in combination with time-release technology.

Yet another object is to provide fertility-enhancing seed capsule products having a suitable level of plant food

4

nutrients in combination with a high level of organic matter as soil conditioning material.

SUMMARY OF THE INVENTION

The invention generally addresses a combination seed capsule, comprising at least one viable seed, having an outer surface and acting as a core or pseudo-core of said combination seed capsule; and a coating of a composition comprising a soil conditioning material mounted proximate, including disposed outwardly of the outer surface of said seed.

In general, the coating provides at least one of (i) enhancing broadcast flight properties of the combination seed capsule; (ii) reducing susceptibility to deleterious effects of weather on the combination seed capsule; (iii) enhancing resistance of the combination seed capsule to attack by animals, weeds, or spore-formers; (iv) staged germination of ones of the seed capsules, having seeds, under a given set of conditions, over a period of time longer than the range of germination times inherent in the seeds; (v) enhancing control of moisture about the seed thereby to assist in seed germination; (vi) release of plant nutrients into soil onto which the combination seed capsule is placed; (vii) soil conditioning effect to soil onto which the combination seed capsule is placed; (viii) staged release of plant nutrients into soil onto which said combination seed capsule is placed, over a period of time longer than the range of times inherent in the chemical composition so released; (ix) higher embryo emergence and survival rate in a population of the seed capsules, thereby reducing required seed planting density for a desired plant population density; and (x) assisting in stabilizing moisture content in soil on which such seed capsule is disposed.

While a wide variety of seeds may be used, in general such seeds are selected from the group consisting of grass, vegetables, grains, and flowers.

Preferably, the coating comprises the soil conditioning material in combination with at least one ingredient effective to reduce susceptibility of the seed capsule to deleterious affect of at least one of animals, weeds, and spore-formers. In some embodiments, the ingredient for reducing such susceptibility of the seed capsule is selected from the group consisting of herbicides, fungicides, for example metalaxyl, and a bitter substance.

In some embodiments, the combination seed capsule further comprises a second coating, separate from the first coating, and comprising at least one ingredient effective to reduce susceptibility of the seed capsule to deleterious effect of at least one of animals, weeds, and spore-formers.

Some embodiments are effective to provide a plant nutrient at a desirable controlled distance from a plant seedling emerging from the seed, in an amount beneficial to the plant seedling.

In other embodiments, the second coating material is intermingled with the first coating material in an outer portion of the first coating, and generally displaced from the seed.

The second coating material can comprise a plant nutrient, beneficial in location and in amount of availability, to a plant seedling emerging from the seed. The second coating composition can comprise an inorganic form of a plant nutrient and can be selected from the group consisting of nitrogen, phosphorus, and potassium. The second coating composition can comprise urea or an inorganic form of a plant nutrient and can be selected from the group consisting of e.g. monammonium phosphate, diammonium phosphate,

superphosphate, triple superphosphate, dicalcium phosphate, and potash or a nutrient such as sulfur, manganese, copper, boron, iron, magnesium, or chromium.

A population of the seed capsules can comprise coatings having a range of properties affecting germination rate of the seeds, thereby to stage germination of the seeds in the population over a period of time longer than the range of germination times inherent in uncoated ones of the seeds. Such properties can be, for example, a range of hardnesses, or a range of thicknesses, of the coatings.

The coating can comprise a first layer of the soil conditioning material, and a second layer comprising an inorganic, and/or organic, fertilizer, and/or at least one nutrient, such as, for example, sulfur, manganese, copper, boron, iron, magnesium, or chromium.

A preferred soil conditioning material is a sludge composition, such as a fiber-containing by-product of a paper making operation, or sewage sludge.

The seed capsule can comprise a water-leachable plant nutrient, and/or a leach-retardant composition, such as wax, effective to retard leaching of the leachable plant nutrient out of the combination seed capsule.

In some embodiments, in a population of the combination seed capsules, the coatings in ones, but less than all, of the population, comprise ingredients effective to retard effective penetration of a seed-germinating environment to the seed for germination thereof.

In embodiments preferred for some applications, the seed capsule comprises an inner layer on the outer surface of the seed, and an outer layer, the inner layer enhancing properties of the seed for acting as nucleus in an agglomeration operation agglomerating the coating onto the inner layer.

In some embodiments, the coating comprises an admixture of the soil conditioner and a plant nutrient.

In preferred embodiments, the coating remains generally disposed about the seed, and preferably but not necessarily remains generally intact about the seed, until the seed germinates.

The invention further comprises a plant growing medium extending over an area, the plant growing medium having a root zone, and a top surface of the root zone generally corresponding with a top surface of the plant growing medium, the plant growing medium having a first overall soil condition and texture; and a population of seed capsules disposed over the top surface of the plant growing medium, the seed capsules comprising individual seeds, having outer surfaces, and coatings of soil conditioning material disposed outwardly of the outer surfaces of the seeds, the coatings of the seed capsules providing localized germination and growth environments, at and adjacent the seeds, having texture, and nutrient and water holding properties for supporting seedling health, superior to respective properties as provided overall in the root zone of the plant growing medium.

The invention yet further comprises a method of providing plant micronutrients to soil, the method comprising placing onto the soil a population of combination seed capsules, each comprising at least one seed, and a coating comprising a plant nutrient material.

The coating can comprise a first coating comprising the plant nutrient, and a second coating, separate and distinct from the first coating, and comprising a soil conditioning material.

The invention yet further comprehends a method of providing a seed bed having enhanced growing conditions

for growing seed, the method comprising coating a population of the seeds with a coating material, and thereby providing coatings thereon of such material, the material tending to stabilize, in the seed capsules, or in soil on which the seed capsules are disposed coating compositions which tend to hold, moisture adjacent the seeds in the seed capsules or in soil adjacent the seed capsules, in such quantities and for such times as to enhance growing conditions for the seeds; and placing the population of seeds on soil effective to support germination of the seeds which are in the seed capsules.

In some embodiments, the seed capsules comprise inner layers on the outer surfaces of the seeds, and outer layers, the inner layers enhancing properties of the seeds for acting as nuclei in agglomeration operations agglomerating the coatings onto the inner layers.

The invention yet further comprehends a method of making a population of combination seed capsules, each comprising a seed, and a coating of a soil conditioning material, the method comprising pre-coating the seed with a material which enhances the ability of the seed to act as a nucleus in an agglomeration operation, to form a pre-coated substrate; and subsequently coating the pre-coated substrate with a soil conditioning material. A preferred pre-coating material comprises dicalcium phosphate.

In general, the pre-coating step typically results in an overall increase in the density of pre-coated seed combination. The pre-coating step can be accomplished by, for example, spraying the pre-coating material onto the seed, and subsequently driving off such as by drying, as necessary, any solvent or other liquid carrier used for application of the coating material to the seed.

In yet other expressions, the invention comprehends a method of providing an enhanced seed germination environment in combination with placement of a controlled amount of plant nutrients in controlled proximity to each seed, the method comprising providing a population of seeds, coated with a soil conditioning material which tends to enhance germination of the seeds, and with plant nutrient composition effective to enhance growth of plant embryos emerging from the seeds; and placing the population of seeds on soil effective to support germination of the seeds. In such method, the coating material can include a second ingredient comprising plant nutrient moisties.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a transverse cross-sectional view of a coating drum suitable for spray-coating substrate seed according to the present invention.

FIG. 2 is a partially cut away view showing a length of the drum of FIG. 1.

FIG. 3 is a schematic representative flow diagram illustrating a first manufacturing process for producing combination seed capsule product of the invention.

FIG. 4 is a block diagram illustrating a second manufacturing process for producing combination seed capsule product of the invention.

FIG. 5 is a schematic representative flow diagram illustrating a third manufacturing process for producing combination seed capsule product of the invention.

FIGS. 6A, 6B, 6C, and 6D show cross sections of seed capsules of the invention.

FIG. 7 illustrates a cross-section of the soil root zone, and a representative population of seed capsules at the top surface of the soil.

FIG. 8 illustrates a single seed capsule on the soil surface, and the micro-environment developing about the seed capsule.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

The following is a detailed description of the illustrated embodiments of the present invention which provides combination seed capsule products that provide for a combination of efficient and proper seed placement in the soil, soil conditioning properties at the specific site of the seed, plant nutrients at or near the specific site of the seed, ingredients effective to reduce deleterious effects of spore-formers and animals, and/or other various physical benefits/properties of the combination seed capsule not previously available in a single product.

In general, at least one seed substrate and at least one soil conditioning material are selected as raw materials, and are combined to make a combination soil conditioning seed capsule product of the invention.

The invention can operate with any of a wide variety of soil conditioning materials such as municipal or other sewage sludge, scrubber sludge, paper mill sludge, fly ash, dust, animal waste, other organic materials, and mineral soil conditioning materials.

The soil conditioning material can be a solid material having a melting temperature so high that handling such material in the melt state is impractical and/or undesirable in view of the limited temperatures at which the seed will remain viable. For example, the soil conditioning material may be combustible at a temperature lower than its melt temperature, or will melt only above temperatures which can be tolerated by the seed, such that viability of the seed would be destroyed if melting were attempted in an environment which exposed the seed to such temperatures. Thus, handling such material in the melt state is impractical, whereby other methods of handling the soil conditioning material may be desired.

Solid sewage sludge, sawdust, and solid animal waste are representative of soil conditioning materials which cannot be readily melted. In the alternative, some soil conditioning materials such as sewage sludge, paper mill sludge, sawdust, and solid animal waste can be suitably comminuted and then dissolved or suspended in water or other solvent composition for processing purposes, optionally along with other soil conditioning materials and/or inorganic chemical fertilizer materials, and the solvent subsequently driven off to make a resulting solid product.

Chemical fertilizers generally are distributed in commerce as solid state materials. Such material is generally produced in manufacturing steps either in solution or in the melt state to meet a specified narrow range of size, hardness, and plant nutritional characteristics, distinct to the application of each such product. Examples of such fertilizers include nitrogen, phosphorus, and potassium containing products such as urea, monoammonium phosphate, diammonium phosphate, superphosphate, triple super phosphate, dicalcium phosphate, potash, and the like. The chemical fertilizer can be a mixture or other physical combination of known inorganic fertilizer chemicals, and may include desired amounts of nutrients such sulfur, manganese, copper, boron, iron, zinc, and the like.

In preferred embodiments of this invention, a precursor seed capsule, having one or more coatings of the soil conditioning and/or other material thereon may first be prepared as a solid or semi-solid particle or agglomerate.

The soil conditioning raw material may be a particulate powder, or may be fibrous, or may be a suspension of a powder or fibrous material in a liquid carrier, and is preferably coated onto the substrate seed to form a seed capsule or other agglomeration of particles, fibers, or the like. Where the soil conditioning material is, for example, sewage sludge, the sewage sludge raw material can be obtained as a slurry that may be bound together as with a binder, preferably an organic binder, when dried. The slurry may be spray-applied to the substrate seeds, for example to a rolling bed of such seeds, in combination with a flow of air to evaporate water from the thus-applied coating. Such sewage sludge, or paper mill sludge, need not be reacted or otherwise treated with any acid, caustic, or any other chemical before being applied and/or dried, or partially dried, either in preparation for, or after, the slurry application of the sludge to the seed substrate.

Specifically, the sewage sludge or paper mill sludge used herein as soil conditioning raw material need not be treated to transform such sludge into colloidal form. Thus, the sludge preferred for use herein is generally non-colloidal in nature, and is distinguished by its non-colloidal nature from conventional sludges which are specifically treated to provide the colloidal characteristics thereto.

Natural lignin, lignosulfonates, and the like, may serve as suitable binders where the soil conditioning material is, for example, paper mill sludge, raw wood, sewage sludge, or other organic or inorganic material. In the case of, for example, calcium chloride or other inorganic additives, such materials may be added to the primary coating, e.g. onto or into the sludge coating, by well-known processes.

Soil conditioning material used herein may be devoid of such conventional plant nutrients as nitrogen, potassium, and phosphorous, or may have such limited plant nutrient value, or may be so unbalanced in nitrogen, phosphorous, and potassium content, that the soil conditioning material may not, by itself, be a desirably complete material for use as the only ingredient in the seed coating. Thus, such soil conditioning material may have limited application herein where basic level of soil fertility is seriously degraded. However, all soil conditioning materials contemplated herein beneficially modify soil to which they are applied, in some way other than direct provision of nitrogen, phosphorous, and/or potassium or other plant nutrients. By use of soil conditioner in intimate association with the seed, this invention not only enhances soil condition of the growth medium/soil to which it is applied, it also provides soil conditioning value to the seed so coated, and in intimate association with the seed, irrespective of the general tith condition of the growth medium into or onto which the seed capsule is applied.

Further to preferred embodiments, typically a first coating material (e.g. soil conditioning material) is readily converted into liquid state such as liquid suspension, and is provided to the process as a liquid. As a general statement, the first coating material may be sprayed onto the substrate seed, then is converted back to solid state on the thus-created seed capsules or seed capsule precursors. In the alternative, the coating material may be mixed with the seed in an (e.g. ribbon) blender, or may be otherwise coated onto the substrate seed in an agglomeration process according to well-known conventional agglomeration principles.

Regarding the coating process, the coating Material can accumulate as a single or multiple layer coating on the outside of the seeds to form a population of combination seed capsules. The layer or layers of coating material can be

a homogeneous or heterogeneous mixture of the desired elements. Further, such population of combination seed capsules can have a range of hardnesses and thicknesses for improved seeding treatments.

Cooperating inner and/or outer layers may be used e.g. to control direct contact between the seed and moisture. Suitable materials and processes therefore are taught in U.S. Pat. No. 3,698,133 Schreiber and U.S. Pat. No. 4,759,151 Gerber, and are thus well known in the art.

In some embodiments, a second coating material may penetrate into the layer of soil conditioning coating material. Such penetration may comprise a generally uniform distribution of the second coating material throughout the first coating material, or may represent a more stratified or otherwise heterogeneous distribution of second coating material in or on the first coating material.

In other embodiments, the coating materials may be mixed into a heterogenous layer. Such layer or layers of heterogenous material can then be coated upon the outside surface of the seed.

Where the liquid state of a coating material was obtained by slurring or otherwise combining the coating material with water, the liquid fraction is reduced after application of the liquid-state material to the substrate seed, or to the growing seed capsule, to effect solidifying of the coating material after application of the coating material to the substrate seed. The liquid fraction is reduced by driving off the liquid carrier, as by medium or low temperature air, or vacuum or other flash drying, after or during application of the coating material to the substrate seed. The resulting solid seed capsule, comprising the seed coated with the e.g. sludge coating material, is then recovered as a combined soil conditioning seed capsule product of the invention.

Spraying of the liquid coating material can be accomplished by a variety of known processes such as, but not limited to, pneumatic, hydraulic, or electrostatic spraying processes. The temperature and pressure of the material being sprayed depends on the material selected, and the viscosity and other parameters of the respective material in the respective liquid state. While high atomization is desired, such is not critical. The liquid coating material need only be atomized sufficiently to provide a generally uniform coating on the substrate seeds, as determined after the coating and solidification steps in fabricating the seed capsule product are completed.

Indeed, the uniformity of coating or coating thickness about the seed is typically not critical so long as the seed is not on or immediately adjacent an outside surface of the capsule such that the seed may fall out, or be easily broken out, of the capsule, or easily removed by dissolution of materials at and near the surface of the seed capsule. In addition, the seed should not be so near the outside surface of the capsule as to be in a nutrient layer having such high concentration of nutrient as to be toxic or otherwise detrimental to viability or growth of a plant emergent from the seed.

Spray application of the coating is suitably controlled to achieve the required addition of the spray material, liquid and/or powder, coating to the substrate seed or precursor seed capsule. An illustrated method of applying the liquid material to the substrate seed or precursor seed capsule is by using a rotating drum spray-coating apparatus. Other apparatus and methods, for example a tilted pan coating process, can be used to apply the soil conditioning material and optionally a chemical fertilizer material onto the substrate seed. The coating operations can be batch operations or continuous operations.

As illustrated in FIGS. 1, 2, and 4, spray apparatus can operate within a rotating drum disposed in a generally horizontal orientation. The drum may incorporate internal lifting flights which lift free-flowing (e.g. seed and growing seed capsule) particles in the drum and then let the particles fall to the bottom of the drum as a continuously falling curtain or cascade. In some embodiments, the interior of the drum is either clean and free from any fighting, or has only mixing fingers or flights that expand the area covered by the bed, that keep the bed rolling as the drum rotates, and that generally improve mixing, rather than lifting particles to the top of the drum and then releasing them in a falling cascade. However, such lifting of particles to the top of the drum, and corresponding falling cascade or falling curtain, are not excluded from processes of the invention. Rather, both such finger mixing, and such lifting coupled with falling cascade or curtain, are included within the scope of the invention.

Stationary spray nozzles are positioned within the drum to project the sprayed material onto the rolling bed, and optionally onto any curtain or cascade of falling particles. For a continuous process, the drum is preferably inclined at a small angle from horizontal, such as, without limitation, about 0.25 inch to about 0.38 inch from the horizontal for each foot of length of the drum, so that rotation of the drum causes the particles to move from the inlet end of the drum to the discharge end, while maintaining a relatively uniform bed thickness. The optimum degree of incline varies with each set-up and may thus be outside the above range. The important parameter is that the incline contribute to maintaining a bed of seed and seed capsule particles having sufficient uniformity that the spray material can be effectively applied to the particles passing through the drum. The particles are then discharged at the discharge end of the drum.

FIGS. 1 and 2 show schematically a first embodiment of processing equipment which may be used to produce seed capsules of the invention. Such processing equipment includes a drum and sprayer combination suitable for continuously producing coated seed capsules in accord with the invention. Use of the illustrated drum and sprayer combination is not critical, however, as other drum and sprayer combinations, or other coating methods such as pan coating methods, are also suitable. Referring to FIGS. 1 and 2, drum 10 has an inlet end 12 for receiving the substrate seed material or materials, or partially formed or pre-coated seed capsule precursors. Drum 10 has a discharge end 14 through which agglomerated or otherwise coated seed capsule product particles are discharged over discharge retaining ring 16. A variable speed rotary drive (not shown) is provided for supporting and rotating the drum 10 in a counterclockwise direction as viewed in FIG. 1 at controlled, and changeable drive speeds. Conventional slope adjustment apparatus (not shown) is provided for routine and ongoing adjustment the slope of the drum from horizontal.

Air is preferably supplied from discharge end 14 as shown in FIG. 2, and flows countercurrent to the direction of travel of the seed substrate material. Since the contemplated coating materials are generally applied to the seed in liquid, or semi-liquid, or other moist form, and since some coating materials may thus tend to form clumps or otherwise self-agglomerate when exposed to ambient moisture conditions, air supplied at discharge end 14, and elsewhere in the process for contact with the coated seed and seed capsules, is preferably dried in order to cost-effectively remove an optimum amount of the moisture from the coating material and to assist in maintaining suitably low moisture content in the thus coated and dried seed capsules.

11

A first stationary spray assembly 28 extends longitudinally within drum 10 above and adjacent the bed 20 of seed and/or seed capsules. First spray assembly 28 includes pipe 29 and nozzles 30. A second spray assembly 32 extends longitudinally within drum 10 generally adjacent first spray assembly 28. Second stationary spray assembly 32 includes pipe 33 and nozzles 34, which transport the material to be sprayed. Nozzles 30 and 34 are connected to pipes 29 and 33 respectively, and project sprays of liquid or otherwise particulate coating material toward the bed of seeds and/or seed capsule precursors. The description of spray assemblies 28, 32 as stationary means that the spray assemblies do not rotate with drum 10. However, the positions of either nozzles 30, 34 or pipes 29, 33, or both, can be adjusted within the drum for proper direction of the respective spray or sprays onto the bed of seeds and/or seed capsules or seed capsule precursors.

A stationary protective cover 24 is mounted over the spray assemblies. Seeds and/or seed capsules falling from the inner surface of the drum and the flights, above the spray assemblies, fall onto the cover, and are deflected away from the spray assemblies, as shown in FIG. 1. Thus, cover 24 protects the pipes and nozzles from the falling seeds and seed capsules falling onto and fouling the pipes and spray nozzles.

As drum 10 rotates, flights 22 lift and mix the seeds, seed capsule precursors, and seed capsules, but do not generally carry the bulk of the seeds and seed capsules up to the top of the drum. Some small amount of seeds, seed capsule precursors, and seed capsules will be carried upwardly to the top of the drum by even a drum devoid of any flights. Thus, all drums experience some amount of seeds and seed capsules falling from the upper part of the rotating drum whereby cover 24 is beneficial for protecting spray assemblies 28 and 32.

Preferred flights 22 are primarily directed toward enhancing mixing of the bed 20 of seeds and seed capsules, continually refreshing the surface of the bed with a newly-emergent supply of seeds and seed capsules, rather than lifting and subsequently dropping the seeds and seed capsules which may be fragile when initially coated. To that end, each flight 22 preferably, but without limitation, has a leading surface 23A extending at an obtuse angle "A1" of at least 90 degrees with respect to the inner surface of the drum. A more preferred angle "A1" is about 100 degrees to about 150 degrees. Trailing surface 23B of flight 22 can be virtually any angle, with the inner surface of the drum, which angle does not interfere with the operation of adjacent leading surfaces 23A.

Additional retaining rings can be added to the assemblage shown in the drawings, in order to provide that height "H" to the retaining ring which will provide and maintain the optimum configuration of bed 20 inside drum 10.

As noted above, inlet end 12 of the drum may be raised above discharge end 14. When in use, the drum rotates continuously. Seeds or previously thinly-coated or partially-coated seed capsules are continuously fed into inlet end 12 and thus added to rolling bed 20. Flights 22 continuously mix the bed as the drum rotates, refreshing the bed surface with newly fed seeds, or seeds and seed capsules newly brought to the surface by the continuous rotation of the drum in combination with the mixing action of the flights. Spray assembly 28 sprays the desired coating material (e.g. sewage sludge, paper mill sludge, or other coating composition, onto the continuously moving and mixing surface of bed 20 from a plurality of nozzles 30 distributed along the length of pipe

12

29, and similarly along the length of drum 10, adding the sprayed material to the seeds and seed capsules in bed 20. After receiving the spray coating from spray assembly 28, the seed capsules are discharged through discharge end 14. In some embodiments, the seed capsules pass through a cooling chamber, not shown, integral in drum 10, before being discharged through discharge end 14.

In general, as the seeds traverse the drum, from inlet to discharge, nozzles 30 atomize the liquid or other coating material and spray such atomized coating material as e.g. droplets of the coating material onto the seeds in the bed. The result is that the seeds become generally uniformly coated with one or more layers of the coating material such that the coating material becomes an integral part of the respective seed capsules fabricated in the drum. As the coating material solidifies on the seeds, the coating material tightly bonds to the respective portions of the seeds.

As the seeds and seed capsules roll and mix with rotation of the drum, the incline of the drum causes the seeds and seed capsules to travel from inlet end 12 toward discharge end 14.

In the alternative, or where a coating material is not readily self-bonding to the seed material, a binder material can be provided toward the inlet end of the drum at spray assembly 32, through pipe 33 and nozzles 34. In such embodiment, the binder is preferably sprayed onto the seeds closer to inlet end 12 rather than along the entire length "L" of the drum. The coating material is then preferably sprayed onto the seeds downstream from the inlet end, and preferably relatively downstream of nozzles 34. Thus, the seeds receive a first coating of the binder, and a subsequent second coating of e.g. liquid soil conditioning coating material overlying the binder.

Binder material applied as e.g. through spray assembly 32 may contain additional coating components such as e.g. flyash, lime, gypsum, or the like, as one or more components for assisting in adding bulk and thickness to an inner binder layer prior to any, or the majority of, the application of the organic coating material (e.g. sewage sludge or paper mill sludge).

In some embodiments, binder and liquid soil conditioning coating material are applied at similar locations along length "L" of the drum whereby binder and soil conditioning coating material may become intermingled/mixed before reaching the seeds, or on the seeds. For example, liquid soil conditioning coating material may be sprayed onto the seeds along the full length of the coating chamber in drum 10 while spraying of the binder material onto the substrate seeds is done relatively closer to or adjacent the inlet end of the coating chamber of the drum. Thus, a first binder layer may underlie or be mixed with the soil conditioning coating material, and may be overlain by a second layer of the soil conditioning coating material. Thus, in this embodiment, the binder layer may typically be a combination of binder material and coating material.

Further, it is contemplated that the soil conditioning coating may be applied first, followed by application of binder or inorganic fertilizer or sealer coating, in which case the binder or inorganic fertilizer or sealer may serve as an outer shell, temporarily trapping the inwardly-disposed materials inside the seed capsule. In the alternative, the soil conditioning coating may be applied first, followed by application of the binder, and wherein the binder penetrates through the soil conditioning coating, either physically or chemically, to the underlying substrate seed and there provides the binding property.

Additional spray assemblies can be provided, spraying additional materials (e.g. inorganic fertilizer materials) onto the substrate seed. Thus, e.g. 6 spray assemblies can spray 6 different coating materials onto the substrate seed. For example, a first spray material can be a binder or primer material intended primarily to enhance bonding of subsequent sprays to the substrate seed. Continuing the example, a second spray can be a combination of binder and finely comminuted particulate material such as lime and/or flyash. A third spray may be a soil conditioning material such as a paper mill sludge or a municipal sewage sludge. Fourth, fifth, and/or sixth sprays can add nitrogen, phosphorous, and/or potassium plant nutrient ingredients, alone or in combination, or as combinations. In this manner, the soil conditioning properties of the seed capsule can be established, and the plant nutrient level of the seed capsule can be enhanced to provide substantially any level of major and/or minor plant nutrients desired in the seed capsule, at substantially any relative ratios of the respective plant nutrients, and wherein the preferably primarily soil conditioning coating provides desired soil conditioning properties in the resulting product, initially for use by the specific seed contained therein, and ultimately as additive to the overall tilth of the growth medium such as soil into or onto which the seed capsule is eventually planted.

A preferred, and rather simplistic, embodiment of the invention is provided by spraying a soil conditioning liquid suspension of sewage sludge or paper mill sludge onto seeds to be encapsulated to make seed capsules. By controlling the amount of the soil conditioning sludge, or by controlling the residence time of the seeds in the drum, a desired thickness of soil conditioning coating can be provided in the resulting coated product.

Typical dried sewage sludge, as a raw material, contains about 2-6% nitrogen, up to about 2% phosphorous, and generally no potassium, and thus has little or no market value as a fertilizer (plant food) product per se. However, by adding e.g. urea, the nitrogen content can be raised if desired, especially as a coating on or adjacent the outside surface of the seed capsule, whereby the combination fertility-enhanced, soil conditioning, seed capsule product has real market value as a comprehensive, self-contained, value-added, seed capsule product. Such product thus contains the seed, a soil conditioning composition which operates somewhat as a seed incubator providing a beneficial germination environment, and a starter quantity of fertilizer selected in quantity and placed in location so as to provide improved, ideally optimum, amounts of plant nutrients at optimum location for use by the newly-emerged embryonic plant at the germination stage of seed development.

Starting with a sludge coating having 2% by weight nitrogen, sufficient urea may be added to bring the nitrogen content to, for example, 5%, 7%, 8% or 10% nitrogen, or more, depending what analysis is desired. Starting with a sludge coating having 6% nitrogen, sufficient urea may be added to bring nitrogen content to, for example, 10%, or whatever other analysis is desired. Phosphorous and/or potassium components and/or materials having combinations of plant nutrient elements (e.g. NPK) can, similarly, be added to the sludge, either before, after, or during addition of the urea. In addition, nitrogen, potassium, and/or phosphorous-containing materials can be combined with the sludge prior to the sludge being applied to the seed.

It should be understood that the more porous the established soil conditioning coating, or e.g. the outer surface of such coating, the more any subsequent spray material penetrates the established coating. All such penetration is contemplated in use of the term "coating" herein.

In some preferred embodiments, the overall coated combination seed capsule product comprises seed capsules wherein substantially the entirety of the soil conditioning material is confined to a contiguously-defined portion of the seed capsule. In such embodiments, the structures of the finished product seed capsules comprise coatings of contiguously arranged elements of the soil conditioning material, generally arrayed entirely or substantially entirely about the seed, which coatings may be overlain by an additional layer, optionally discontinuous, of organic or inorganic chemical fertilizer. Further coating layers of either soil conditioning material or organic or inorganic chemical fertilizer can be applied over the additional layer.

In addition, or in the alternative, other layers of other materials whether soil conditioning materials, organic or inorganic fertilizers, or other materials, can be applied to the substrate seed before applying the above mentioned layer of soil conditioning sludge. Thus, the substrate seed can be coated with a layer of a calcium compound e.g. calcium chloride, calcium carbonate, or dicalcium phosphate, or with a sulfur moiety, and/or a further layer of urea, all with optional use of binder materials.

Further to the structure of the seed capsules of the invention, the coatings on the seed capsules need not generally represent a uniform mixture of the inorganic chemical fertilizer and the soil conditioner. Rather, in a typical seed capsule a core substrate seed is overlain or encapsulated by a soil conditioning material, and is generally free from a second overlying soil conditioning coating material, and wherein the inorganic fertilizer content at the seed/coating interface is relatively higher so as to represent a second coating material such as an inorganic fertilizer coating, as compared to the inorganic fertilizer content at locations at and adjacent the seed.

The second coating can, and preferably does, in some embodiments, penetrate into voids or other interstices in an underlying e.g. soil conditioning coating. However, preferably most if not all elements of the underlying e.g. soil conditioning coating material are generally interconnected with each other without intervening coating material of the second layer, except for an optional binder used to hold the first coating material together as a unitary structure, separate from any structure and bonding provided by the second coating material.

While the combination seed capsule can comprise discontinuities in the soil conditioning sludge coating layer, in combination with an inorganic fertilizer material in such seed capsules, such compositions are less preferred.

Regarding the coating process, FIG. 4 illustrates in flow sheet form a manufacturing process for producing seed capsules of the invention, using the coating drum 10 as described above. It should be understood, however, that other equipment such as a pan pelletizer, a paddle mixer, or the like can be used in place of the rotary drum to obtain combination seed capsules of the invention.

The coating process operates according to conventional and generally well known agglomeration principles, as described by Wolfgang B. Pietsch in an article entitled "The Agglomerative Behavior Of Fine Particles." Such coating process uses water and heat, along with physical and/or chemical adhesives and like properties, to bind or agglomerate a plurality of types of particles and/or materials into coated seed capsules, each typically containing an individual seed.

To obtain agglomerates from relatively smaller particles of raw materials, binding forces must act within the indi-

vidual developing agglomerate particles. According to known agglomeration principles, five different binding mechanisms are known to be useful for building agglomerate particles including solid bridges, interfacial attractions and capillary pressure, adhesion and cohesion, attraction

between solid particles, and form-closed bonds. At elevated temperatures, solid bridges can form by diffusion of molecules from one particle to another at the points of contact. Heat can be introduced from an external, secondary source or created during agglomeration by friction and/or energy conversion. Solid bridges can also be built up by chemical reaction, crystallization of dissolved substances, hardening binders, and solidification of melted components.

Capillary pressure and interfacial attraction forces in liquid bridges can create strong bonds that disappear if the liquid evaporates and no other binding mechanisms take over.

Highly viscous bonding media such as tar and other high molecular weight organic liquids can form adhesive and/or cohesive bonds very similar to those of solid bridges. Thin adsorption layers are immobile and can contribute to such bonding together of fine particles under certain circumstances.

Typical short-range forces of the van der Waals electrostatic or magnetic type can cause attraction between solid particles whereby the particles stick together if such particles are sufficiently close to each other. Decreasing particle size clearly favors such attraction between solid particles.

Fibers, little platelets or bulky particles can interlock or fold about each other resulting in "form-closed" bonds.

Now referring to FIG. 3, in some embodiments of the coating/agglomeration process, it is desirable to pre-coat the seeds prior to implementing agglomeration principles to produce the above described coating of soil conditioning material. Such embodiments comprise light-weight and/or elongate shaped seeds (i.e. grass seeds), or other similar type of seed which may not readily or inherently serve as a nucleating agent in a conventional agglomeration process with the respective soil conditioning material which is desired to be coated on the seed. Pre-coating the grass seed, for example, enhances the agglomeration of paper sludge as a coating material, of binder and/or of other coating substances, by increasing the weight of the pre-coated grass seed and by providing a more filled in, more rounded shape to such long and narrow seeds. The increased weight and more filled in shape of the grass seed enables more effective, more efficient, processing of the seed in coating apparatus such as that illustrated in FIGS. 3 and 4.

Referring to FIG. 3, the form and composition of such precoating, when needed, can vary according to the weight, shape, composition, and surface properties of the seeds, and according to the binder, if any, the soil conditioning coating or coating materials to be applied, and any other inorganic or organic coating material to be applied.

The seeds, whether pre-coated or not, are received within the rotary drum where the soil conditioning material is spray coated onto the substrate seeds to obtain combination seed capsules.

Before coating the seeds with a soil conditioner, the organic soil conditioner material (e.g. paper sludge) is preferably processed through a dryer such as a rotary drum dryer, as needed, to reduce the amount of moisture in the organic soil conditioner material to less than about 8% water by weight. Such drying is an essential step where the material is otherwise above the nominal 8% effective water

content, to enable grinding the sludge to a size less than US Standard 20 mesh screen, and to prevent the particles from agglomerating with each other. Certain of the coating materials, e.g. fly ash, because of their physical properties, need not be dried before being ground to a suitable size for participating in the agglomeration operation.

The seeds, whether pre-coated or not pre-coated, and the one or more soil conditioners, are received within a mixer where growth enhancers such as time release agents and/or other environmental conditioners may be added to form a combination seed capsule. The thus pre-coated seeds are then received into a pan pelletizer, a rotary drum, or the like, where binders such as lignin, lignosulphonates, molasses, sodium silicate, wax, monammonium phosphate, or urea can be added and thereby coated onto the pre-coated seeds. Other materials which can be added to the seed capsule at the e.g. rotary drum include anti-fungal coatings such as with metalaxyl fungicide, for example, Apron® and/or Subdue®, available from Novartis, Inc. of Greensboro, N.C.

The such-coated seeds are then passed into a rotary or other dryer in order to obtain a seed capsule containing 5% or less water. The maximum water fraction in the coating can vary according to the composition of the coating material, so long as the resultant seed capsules remain suitably structurally strong and so long as a population of such coated seed capsules remains free flowing in solid condition. The process for fabricating the seed capsules must maintain a temperature sufficiently low that the seeds are not heated so hot that viability of the seeds, for germination purposes, is not dramatically compromised. It is generally preferred that the temperature of the seeds be suitably controlled such that any binder and/or coating material, or other materials applied to the seeds, cool at a controlled rate while bonds form between the seeds, or seed capsule precursors and the one or more soil conditioning and/or other coating materials. Such temperatures of all materials are suitably controlled to avoid decomposition of the respective materials, loss of viability of the seeds, or breakage of seed capsules or seed capsule precursors, or coatings or coating or other materials during such processing. The temperature at the rolling seed bed inside drum 10 generally can range from about 130 degrees F. to up to at least 230 degrees F. for seed residence times up to at least 1 hour. At drum operating temperatures of less than 130 degrees F., drying time can become excessive. At temperatures above 230 F., the viability of the seed may be at risk, depending on the sensitivity of the seed, residence time, and other influential parameters.

The above stated temperature range is illustrative and not limiting, and will vary depending on the seed, the coating materials, and the specific process parameters of a particular coating system and coating operation. Thus, maximum e.g. drum coating temperatures can be less than 130 degrees F. or more than 230 degrees F. However, the stated range is preferred, including all temperatures within such range such as, for example, 150 degrees F., 180 degrees F., 210 degrees F., and the like.

Referring to the drum of FIGS. 1 and 2, and to the pan pelletizer block in FIG. 3, the seeds are fed continuously to an inlet as at inlet end 12 of drum 10. Combination seed capsules, produced as described above, are released from a discharge locus such as discharge end 14 of the drum to a sizing apparatus 36 in which the seed capsules are sized through conventional sizing elements. Suitably-sized seed capsules are discharged from the sizing apparatus as product for distribution. Undersize seed capsules are fed back into mixer as shown in FIG. 3. Oversized seed capsules are fractured and screened for reprocessing.

The recovered seed product can be further coated with any of the coating materials described above, such as urea or other inorganic or organic fertilizer, and/or with growth enhancers or other desirable materials. Further, other types of coating materials such as water repellents can be coated onto the discharged seed capsules for the purpose of imparting additional desirable properties to the seed capsules.

In the process of coating porous organic materials such as sewage sludge or paper mill sludge as is optional in the invention, with a second material which is applied for other than imparting soil conditioning properties, for example an inorganic fertilizer, the general size of the coated seed capsule may be the same after applying the second material (e.g. inorganic fertilizer) as the size of the previously-coated seed capsule, or may be similar in size. Namely, the quantity of coating material added to the seed capsule can be so small as to not materially affect seed capsule size, or the coating material can be received into an e.g. porous interior of the soil conditioning coating of the seed capsule, or both.

It is contemplated that the operation and functions of the invention have become fully apparent from the foregoing description of elements, but for completeness of disclosure, the usage of the invention will be briefly described.

EXAMPLE 1

A coating drum as illustrated in FIGS. 1, 2 and 4 is used to place a coating of paper mill sludge on grass seed. Raw material grass seed about 4-6 millimeters long and about 0.5-1.0 millimeter thick, is continuously fed to pre-treater 11, where the seed is blended with powdered lime, powdered flyash, and a lignosulfonate binder, to form partially-developed seed capsules comprising seeds coated with relatively thinner coatings of the recited mixture of coating materials. The partially-developed seed capsules are continuously fed to inlet end 12 of drum 10, to form a bed 20 of the partially-developed seed capsules. The drum rotates continuously. The rolling of the drum, and the associated mixing affect of the flights, provide a constantly changing top surface of the bed. A paper mill sludge slurry is supplied in pipe 28 at pressure sufficient to atomize the liquid sludge slurry. A liquid sludge slurry is thus sprayed from nozzles 30 onto the top surface of the bed of partially-developed seed capsules, applying a sludge coating on those partially-developed seed capsules which are at the upper surface of the bed at any given point in time.

The resulting seed capsules, of paper mill sludge coated seeds, have a coating of soil conditioning sludge thick enough to make the material a product marketable for its soil conditioning content as well as for the seeds contained therein. Increased levels of nitrogen and/or other plant nutrients can be added by, without limitation, providing sprays of the other desired materials, preferably subsequent to at least the initial sludge slurry spray. Other materials can be included in one or more of the sprays e.g. to retard or enhance moisture permeation into or out of the combination product in accord with the anticipated storage and/or use environment of the product.

EXAMPLE 2

FIG. 5 illustrates the equipment used in this EXAMPLE 2. As seen therein, grass seed, lime, flyash, and calcium lignosulfonate binder are fed to ribbon blender 111 by respective screw feeders 112A, 112B, 112C, 112D respectively. Ribbon blender 111 encapsulates the seed with a thin layer of the mixture of lime, flyash, and lignosulfonate to thereby make partially-formed seed capsules. The partially-

formed seed capsules are discharged from the ribbon blender and conveyed by conveyor 114 and belt feeder 116 to a tilted-pan pelletizer 118, which rotates about a fixed axis.

Paper mill sludge is received into a weigh hopper 120 at about 60% by weight water, and is fed by screw feeder 122 and belt 124 to pin mixer 126. The pin mixer breaks down the fiber and fiber clusters of the sludge into loose separate fibers, and discharges the resultant material onto conveyor 128 which transports the material to screw feeder 130, and thence into the tilted pan pelletizer.

In the tilted pan pelletizer, the partially-formed seed capsules, (seeds being coated with lime, flyash, and lignosulfonate) are mixed with the comminuted paper mill sludge and thereby coated with the sludge. By operation of the tilted rotating pan pelletizer, the larger seed capsules generally rise to the top of the bed of seed capsules in the pan, and as additional material (sludge and partially-formed seed capsules) are added to the pan, the larger seed capsules overflow the lower edge of the rotating pan, onto vibrating feeder conveyor 132. The vibrating feeder conveyor feeds the seed capsules into granulator 134 (e.g. rotating drum) where the seed capsules may be (e.g. spray) coated with inorganic fertilizer or other desired material.

From the granulator, the seed capsules flow into dryer 136 and are dried to a final product moisture of about 2-3% by weight water. The resultant product is then screened and sized as before, with undersized and oversized product seed capsules being recycled for further processing.

Urea and other liquid chemical fertilizers can, as indicated, be used as binders to bind together soil conditioning coatings which are not readily self-bonded together. In such embodiments, the urea or other liquid fertilizer composition serves as the binder or glue which holds together the soil conditioning material which is used as the coating. Other binding materials may be used either alone or in combination with the chemical fertilizer. Any plant nutrient components of the binder/glue composition contribute to the plant nutrient value, e.g. nitrogen, phosphorous, and/or potassium, provided by the so-made seed capsules. Thus, a binder/glue, or a multiplicity of binders/glues, properly selected as to nutrient value can provide, in the finished product, significant contribution to any desired fertility analysis.

A primary purpose of soil conditioning products is to condition the soil in terms of properties other than direct provision of plant nutrients.

The primary purpose of conventional inorganic chemical fertilizer products is to directly provide plant nutrients. It is well known that highly purified forms of inorganic chemical materials are more concentrated than desired in close or intimate proximity with seed, in the growing medium. Thus, inorganic chemical fertilizers can be diluted in concentration and still have sufficient nutrient content to be highly useful additives in soil conditioning seed capsules of the invention. It is common practice to modify and thus dilute inorganic chemical fertilizer products with filler materials that do not provide plant nutrients, in order to provide less concentrated fertilizer products. To the inventor's knowledge, such diluents, however, do not include soil conditioning products, especially not organic soil conditioning products.

It is conventionally known to apply commercially available soil conditioning materials and inorganic fertilizers, in separate applications, to a given common plot of soil to assist the soil in growing a crop. For example, it is known to make a first broadcast or other placement of lime to control pH of the soil, followed by a second broadcast and/or

19

row-applied placement of granular inorganic chemical fertilizer. It is also known to make sequential applications of a soil conditioning material such as fresh or aged manure followed by inorganic fertilizer, all of which may be separate from the step of applying seed. And where seed is indeed applied in the same step, the seed and soil conditioner are not intimately bound in controlled positioning with respect to each other in common in individual particles of the product so applied, as in the invention.

To the inventor's knowledge, it is not known to apply soil conditioning material and inorganic chemical fertilizer in a common carrier/particle. Nor is it known to apply seed in a seed capsule wherein the seed is intimately combined with a soil conditioning material in a common particle, optionally with an inorganic fertilizer component in controlled positioning with respect to the seed in the same capsule as a seed-soil conditioning particle.

In those embodiments of the invention comprehending both soil conditioning and inorganic fertilizer in the same seed capsule/particle, the ratio of soil conditioning material to inorganic chemical fertilizer material can vary, from, for example, about 80% by weight up to less than 100% by weight soil conditioning material, with corresponding greater than 0% up to about 20% by weight inorganic chemical fertilizer. Generally, the invention as practically applied, however, is somewhat more narrowly defined, because the practical benefits of the invention are achieved at more balanced combinations of the soil conditioning material and the inorganic chemical fertilizer.

Thus, a preferred amount of soil conditioning material is about 90% by weight to about 98% by weight soil conditioning material, in combination with about 2% by weight to about 10% by weight inorganic chemical fertilizer. To the extent the soil conditioning material is present in amount less than about 80% by weight, the corresponding 20% by weight organic fertilizer in such close and intimate proximity to the seed may be toxic to the seed. To the extent the inorganic fertilizer is present in an amount of less than 2% by weight, the beneficial fertility affects of the fertilizer may not be perceived.

To the extent the inorganic fertilizer can be confined in a layer displaced from the seed, a higher level of inorganic fertilizer may be used while limiting risk of a toxic response from the seed. Referring now to FIGS. 6A-6D, in the embodiment of FIG. 6A, seed capsule 38A comprises a seed 40A coated with a single generally homogeneous coating 42A. Coating 42A, as illustrated in FIG. 6A, may comprise only the soil conditioning material (e.g. paper mill sludge or sewage sludge), or may comprise both the soil conditioning material and an inorganic fertilizer or other inorganic material generally dispersed in coating 42A.

In FIG. 6B, seed capsule 38B comprises a seed 40B coated with a first layer 42B of soil conditioning material. A second coating material is shown penetrated part-way through the first layer 42B, thus to make a combination outer layer 44B comprising the combination of the material of layer 42A and the material of the second material, such as inorganic fertilizer.

In FIG. 6C, seed capsule 38C comprises a seed 40C coated with a first layer 42C of soil conditioning material. A second generally separate and distinct layer 46C of a second coating material (e.g. inorganic fertilizer) is disposed outwardly on the underlying first layer 42C. Layer 46C generally does not penetrate layer 42C, whereby higher levels of inorganic fertilizer may be used because of the effective displacement distance between the seed and the second layer

20

46C. The second layer may be prevented from penetrating the first layer by applying e.g. an intervening layer which repels the second layer, for example wax, lignin, or the like.

In FIG. 6D, seed capsule 38D comprises a seed 40D coated with a pre-coating layer 48D of dicalcium phosphate to densify and configure the seed capsule precursor for the primary coating steps in drum 10 or pan pelletizer 118. Layer 42D of soil conditioning material is disposed outwardly of pre-coating layer 48D. Other materials such as at layers 44B or 46C can be added to any of the embodiments, including that of FIG. 6D to provide the properties associated therewith.

In alternative embodiments, seed capsules can comprise a seed coated with at least one heterogenous layer. The heterogenous layer comprises at least two different materials substantially commingled, uniformly or non-uniformly, within a single layer. Such materials can include, for example, soil conditioning material and inorganic fertilizer, nutrients, herbicides, fungicides, binders and/or any other layer material contemplated by the present invention.

While the soil conditioning material/sewage sludge or paper mill sludge may contain a nominal amount of nitrogen and lesser quantities of phosphorous, potassium, and micronutrients, these small levels of plant nutrient content are generally not high enough for the plant nutrients to be considered a primary commercial asset. Yet only small nutrient amounts are desired so close to the seed. Thus, in some uses, the nutrient content of the sludge may be fully acceptable as the sole coating material on the seed in making suitable and acceptable seed capsules of the invention.

Products of the invention offer a new combination of properties, namely readily available excellent soil conditioning properties in combination with the seed in a seed capsule wherein size and density of the seed capsule are controlled to the desired size and weight.

One of the properties offered by soil texture conditioners such as sewage sludge and paper mill sludge is that of maintaining soil condition by retaining moisture in the soil, retarding leaching of soil nutrients from the root zone, and attenuating hardening, clumping, or other hard agglomeration characteristics of the soil, which harder soils are more difficult for plant roots to penetrate than are softer soils. Thus, improving the soil texture condition, soil tilth, increases the efficiency with which plant nutrients are retained and used for plant nutrition, as well as generally improving the environment of the soil to accommodate, and readily receive, root growth.

When soil conditioning materials and plant nutrients are applied separately to the soil, as in the prior art, the ratio of applied plant nutrients to applied soil conditioning material typically varies widely according to variations in the uniformity of the two applications of the two materials. Further, the soil conditioning material is generally not closely associated with the plant nutrient-containing fertilizer in the soil, and certainly neither soil conditioner nor the fertilizer are controllably-closely associated with the seed, such that nutrient absorption benefits provided by the soil conditioning material are not assuredly associated with respective particles of inorganic chemical fertilizer materials, and neither the soil conditioning material nor the inorganic fertilizer is controllably and intimately associated with the seed as in a common capsule or other particle as in the invention.

Rather, where soil conditioning and fertilizer materials are applied in separate applications and/or in applications separate from the application of the seed, the bulk of the soil conditioning material and the bulk of the inorganic chemical

ferti
each
sudi
ing
moi
clor
cal
soil
app
que
not
fer
the
at
se
no
are
bir
sex
ca
fer
se
se
gr
so

fe
fr
T
aj
ir
n
c
o
e
o
a

c
d
a
f
c
s
t
c
t
f

fertilizer are generally at least somewhat separated from each other in space, and physically separated from the seeds, such that potential cooperative benefit of the soil conditioning material as relates to solvation and up-take of soil moisture and/or of the inorganic chemical fertilizer by the seed are not obtained, and/or are not obtained in controlled close association with the seed.

When the soil conditioning material, the inorganic chemical fertilizer materials, and the seed are separately applied to soil with different sets of equipment, the respective rates of application vary such that the desired ratios between the quantities of the several materials are applied somewhat nonuniformly. The variances from uniformity will be different for each of the applications, thus adversely skewing the relative ratios of the materials with respect to each other at different locations in the e.g. field. Further, when applied separately to the soil, the seed and the soil conditioner are not necessarily in intimate contact with each other as they are when both materials are combined into a single combined seed capsule product as in the invention. Nor is the seed in closely controlled proximity (e.g. within the same capsule) with the inorganic fertilizer. In reality, then, any fertilizer added to the soil but not in close proximity to the seed applied to the same soil during e.g. the same growing season, is of reduced value or no value to that application of seed, whereby little or no value is realized, during that growing season, from the application of such material to the soil.

The amounts of soil conditioning material and inorganic fertilizer added to the soil at any given time represent a small fraction of the "soil" in the plant growing zone (root zone). Thus, in the conventional practice of providing separate applications of plant nutrients and soil conditioning material, in addition to the seed, only small fractions of the newly applied soil conditioning material and plant nutrient come into proximate cooperating relationship with each other and with the seed. Thus, the seed and any plant newly emergent from the seed are benefitted only to the extent the overall average root zone of the soil is benefitted by the applied soil conditioning material.

Even were combinations of soil conditioner, inorganic chemical fertilizer, and seed are to be applied as separate and distinct physical product particles, using a single application apparatus and a single application process, the individual particles of soil conditioner, individual particles of inorganic chemical fertilizer, and individual particles of seed would be separated from each other to a significant degree, during the application process, such that the benefits of intimate association with each other in the soil would be lost. Indeed, the seed benefits from intimate contact with a substantial quantity of soil conditioner, but can tolerate intimate contact with only limited concentrations of fertilizer chemicals. Rather, fertilizer chemicals should in general be displaced from, but controllably located close to the seed.

In an uncontrolled application of fertilizer by an application separate from application of the seed, as in the prior art, some of the seed might be expected to be placed so close to some of the inorganic fertilizer as to be damaged by the toxic affect of such close association. Thus, the benefit of intimate contact between organic soil conditioning material, inorganic chemical fertilizer, and seed, is reduced and largely lost because of low levels of intimate association between the soil conditioning material and the seed, and unpredictable, uncontrolled levels of association between the seed and the inorganic chemical fertilizer, outside the combination of the invention, of soil conditioning coating of the seed, and optional addition of inorganic fertilizer at

controlled location with respect to the seed, all in the same seed capsule, as taught herein.

By combining an organic soil conditioning material in the same seed capsule with the seed, highly effective levels of soil conditioner are assuredly associated with the seed as the seed germinates and begins to grow. Where suitable levels of plant nutrient fertilizer are incorporated into the same seed capsule, growth of the newly-germinated plant is further enhanced. In either case, the soil conditioning materials can and do tend to retain moisture and nutrients in the soil in the defined area of the seed capsule by a variety of mechanisms, providing an extended time period during which nutrients can be taken up by the plants. For example, organic soil conditioning material may retain moisture, reducing moisture drainage from the soil, such that the rate of leaching of the nutrients is, in general, reduced. Further, the soil conditioning material may absorb or otherwise physically or chemically attach to plant nutrient materials in the chemical fertilizer material, thus further retarding leaching of the plant nutrient away from the seed.

While applicant cannot place an exact time period on the increase in the extent to which the soil conditioning materials retard leaching of the plant nutrients from proximity with the seed, thereby holding the plant nutrients available for up-take by the plant, any increase in time during which the nutrients are held in the soil proximate the newly-emerging plant is beneficial to meeting the nutritional needs of the plant being so fed.

By incorporating soil conditioning materials and optionally plant nutrient fertilizers, in the seed capsules, the invention offers an efficiency of application of soil conditioning materials in proximity to the seeds most beneficially affected thereby, in a beneficial association never before available. Optional addition of plant nutrients to the same seed capsule provides a largely self-contained microcosm of seed, soil conditioner, and inorganic fertilizer in intimate yet controlled spatial relationship with each other, whereby the controlled spacings provide enhanced plant growth benefit. Namely, soil conditioning materials and plant nutrients are somewhat beneficial to each other for the overall cooperative achievement of soil fertility in the presence of the newly emerging plant which is dependent on such plant nutrients, and on moisture retained by the soil conditioner for uptake of such plant nutrients.

While soil conditioning materials do perform a number of highly interdependent tasks, one such task is in assisting in maintaining the plant nutrients in the root zone where they can be effectively used by the plants when needed. Another such task is in assisting in making the soil soft and friable in the root zone whereby the newly-emerged and very tender plant roots more readily penetrate the soil as they grow.

Where both soil conditioner and fertilizer are incorporated with the seed into the seed capsule, the soil conditioner assists in strategically maintaining the combination of soil conditioner and plant nutrients in close and controlled proximity to each other and to the seed in the soil. Such strategic placement virtually assures that the soil conditioning material and inorganic chemical fertilizer are bound to each other, in proximate relationship with the seed, for a time, such that wherever the seed capsule may land when the seed is sown, the seed will have the initial benefit of both soil conditioner and plant nutrients in intimate proximity with itself, irrespective of any condition of the surrounding growth medium. Thus, in the invention, soil conditioning material and optionally inorganic chemical fertilizer, are inherently bound to each other, and to the seed, as by the

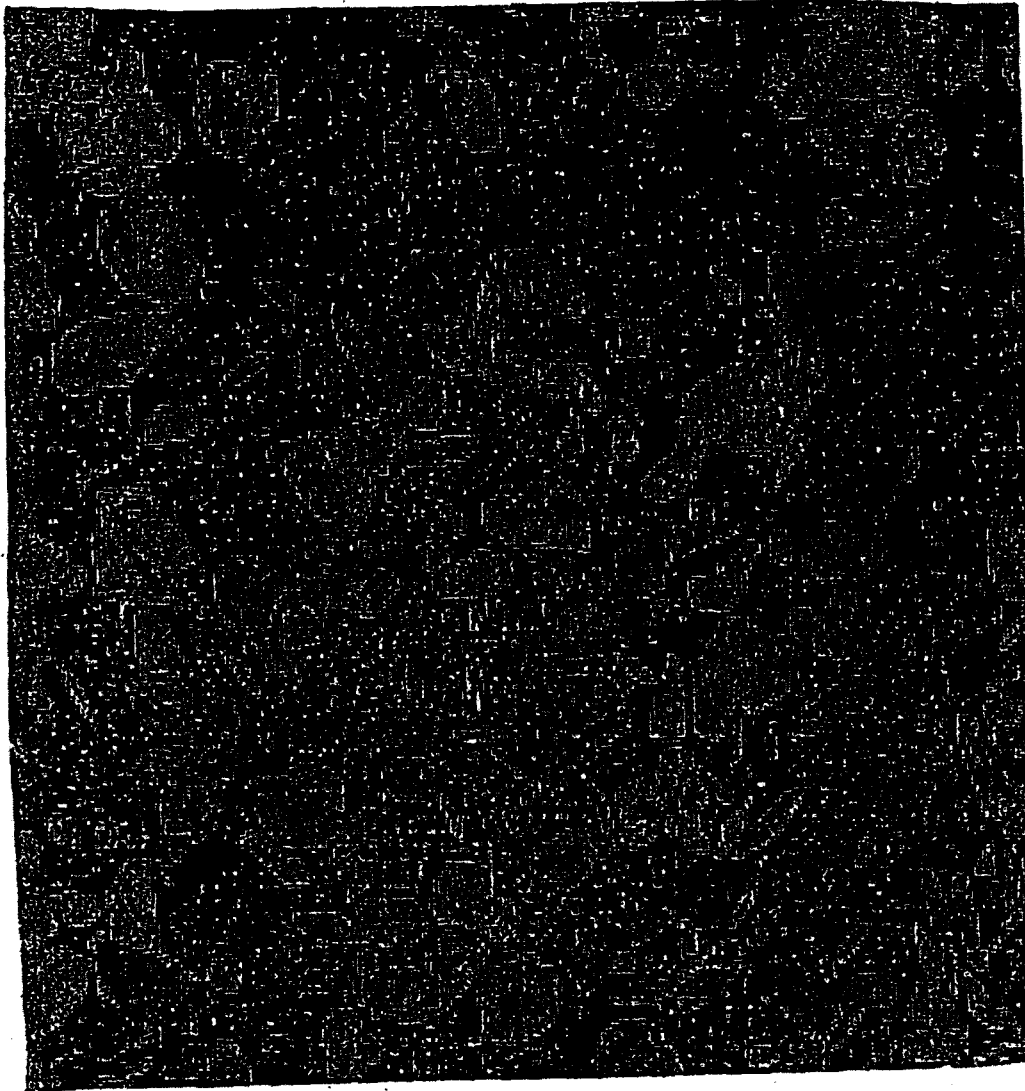


FIG. 1

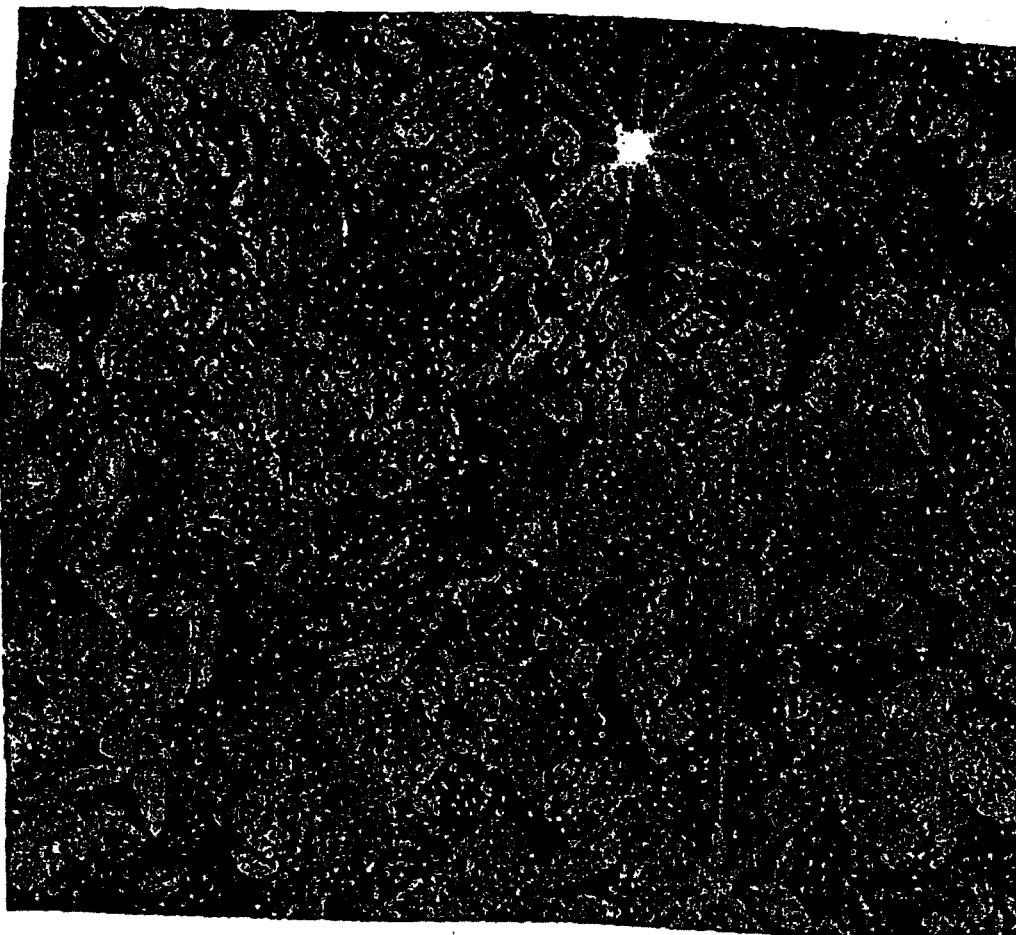


FIG. 2

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF WISCONSIN

ENCAP, LLC

Plaintiff(s),

v.

Case No.

The Scotts Company, LLC, et al

Defendant(s).

CONSENT TO PROCEED BEFORE A U.S. MAGISTRATE JUDGE

In accordance with 28 U.S.C. §636(c) and Rule 73(b) of the Federal Rules of Civil Procedure, the undersigned counsel of record (or pro se litigant) consents to have _____ conduct all proceedings in this case, including a bench or jury trial, and order the entry of final judgment.

Signed and dated this _____ day of _____, _____.

Attorney for plaintiff (plaintiff pro se)

Attorney for defendant (defendant pro se)

MAGISTRATE JUDGES DO NOT CONDUCT TRIALS IN FELONY CASES. ACCORDINGLY, IF THE PARTIES CONSENT TO THE EXERCISE OF JURISDICTION BY THE MAGISTRATE JUDGE, MAJOR CRIMINAL CASES WILL NOT INTERFERE WITH ITS SCHEDULING AND PROCESSING.

REFUSAL TO CONSENT TO PROCEED BEFORE A U.S. MAGISTRATE JUDGE

In the event you are unwilling to consent, sign below.

Signed and dated this 18th day of July, 2011.

s/T. Wickham Schmidt

Attorney for plaintiff (plaintiff pro se)

Attorney for defendant (defendant pro se)

PLEASE SEE THE ORDER ON THE REVERSE SIDE FOR FURTHER INFORMATION.
THIS FORM SHALL BE FILED WITH THE CLERK OF COURT WITHIN TWENTY-ONE (21) DAYS FROM ITS RECEIPT.

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF WISCONSIN, GREEN BAY

-----X
ENCAP, LLC.

Plaintiff,

v.

THE SCOTTS COMPANY, LLC.

THE SCOTTS MIRACLE-GRO COMPANY, LLC.

OMS INVESTMENTS, INC. :

Defendants
-----X

Case No.: 11-_____

CERTIFICATE OF INTEREST

The undersigned, counsel of record for the Plaintiff, ENCAP, LLC, furnishes the following list in compliance with Fed.R.Civ.P. 7.1 and Civil L.R. 7.1:

1. Full name of parties represented:

ENCAP, LLC

2. FI, Inc., a privately held corporation, is the parent corporation of ENCAP, LLC.

3. The law firms expected to appear on behalf of Plaintiff in this matter:

Liebmann, Conway, Olejniczak & Jerry, S.C.
231 South Adams Street
P.O. Box 23200
Green Bay, WI 54305-3200

Andrus, Scales, Starke & Sawall, LLP
100 East Wisconsin Ave
Suite 1100
Milwaukee, WI 53202

WEISS & WEISS
300 Old Country Road, Suite 251
Mineola, NY 11501

CIVIL COVER SHEET

The JS 44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

Place an X in the appropriate Box:

Green Bay Division

Milwaukee Division

I. (a) PLAINTIFFS

(b) County of Residence of First Listed Plaintiff Brown
(EXCEPT IN U.S. PLAINTIFF CASES)

(c) Attorney's (Firm Name, Address, and Telephone Number)
See Attachment

DEFENDANTS

County of Residence of First Listed Defendant _____
(IN U.S. PLAINTIFF CASES ONLY)

NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE LAND INVOLVED.

Attorneys (If Known)

II. BASIS OF JURISDICTION (Place an "X" in One Box Only)

- 1 U.S. Government Plaintiff
- 3 Federal Question (U.S. Government Not a Party)
- 2 U.S. Government Defendant
- 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place an "X" in One Box for Plaintiff and One Box for Defendant)

- | | PTF | DEF | | PTF | DEF |
|---|----------------------------|----------------------------|---|---------------------------------------|---------------------------------------|
| Citizen of This State | <input type="checkbox"/> 1 | <input type="checkbox"/> 1 | Incorporated or Principal Place of Business In This State | <input checked="" type="checkbox"/> 4 | <input type="checkbox"/> 4 |
| Citizen of Another State | <input type="checkbox"/> 2 | <input type="checkbox"/> 2 | Incorporated and Principal Place of Business In Another State | <input type="checkbox"/> 5 | <input checked="" type="checkbox"/> 5 |
| Citizen or Subject of a Foreign Country | <input type="checkbox"/> 3 | <input type="checkbox"/> 3 | Foreign Nation | <input type="checkbox"/> 6 | <input type="checkbox"/> 6 |

IV. NATURE OF SUIT (Place an "X" in One Box Only)

- | | | | | | |
|---|--|---|--|--|--|
| <input type="checkbox"/> 110 Insurance | <input type="checkbox"/> 310 Airplane | <input type="checkbox"/> 362 Personal Injury - Med. Malpractice | <input type="checkbox"/> 610 Agriculture | <input type="checkbox"/> 422 Appeal 28 USC 158 | <input type="checkbox"/> 400 State Reapportionment |
| <input type="checkbox"/> 120 Marine | <input type="checkbox"/> 315 Airplane Product Liability | <input type="checkbox"/> 365 Personal Injury - Product Liability | <input type="checkbox"/> 620 Other Food & Drug | <input type="checkbox"/> 423 Withdrawal 28 USC 157 | <input type="checkbox"/> 410 Antitrust |
| <input type="checkbox"/> 130 Miller Act | <input type="checkbox"/> 320 Assault, Libel & Slander | <input type="checkbox"/> 368 Asbestos Personal Injury Product Liability | <input type="checkbox"/> 625 Drug Related Seizure of Property 21 USC 881 | <input type="checkbox"/> 820 Copyrights | <input type="checkbox"/> 430 Banks and Banking |
| <input type="checkbox"/> 140 Negotiable Instrument | <input type="checkbox"/> 330 Federal Employers' Liability | <input type="checkbox"/> 370 Other Fraud | <input type="checkbox"/> 630 Liquor Laws | <input checked="" type="checkbox"/> 830 Patent | <input type="checkbox"/> 450 Commerce |
| <input type="checkbox"/> 150 Recovery of Overpayment & Enforcement of Judgment | <input type="checkbox"/> 340 Marine | <input type="checkbox"/> 371 Truth in Lending | <input type="checkbox"/> 640 R.R. & Truck | <input type="checkbox"/> 840 Trademark | <input type="checkbox"/> 460 Deportation |
| <input type="checkbox"/> 151 Medicare Act | <input type="checkbox"/> 345 Marine Product Liability | <input type="checkbox"/> 380 Other Personal Property Damage | <input type="checkbox"/> 650 Airline Regs. | <input type="checkbox"/> 861 HIA (1395ff) | <input type="checkbox"/> 470 Racketeer Influenced and Corrupt Organizations |
| <input type="checkbox"/> 152 Recovery of Defaulted Student Loans (Excl. Veterans) | <input type="checkbox"/> 350 Motor Vehicle | <input type="checkbox"/> 385 Property Damage Product Liability | <input type="checkbox"/> 660 Occupational Safety/Health | <input type="checkbox"/> 862 Black Lung (923) | <input type="checkbox"/> 480 Consumer Credit |
| <input type="checkbox"/> 153 Recovery of Overpayment of Veteran's Benefits | <input type="checkbox"/> 355 Motor Vehicle Product Liability | <input type="checkbox"/> 510 Motions to Vacate Sentence | <input type="checkbox"/> 690 Other | <input type="checkbox"/> 863 DIWC/DIWW (405(g)) | <input type="checkbox"/> 490 Cable/Sat TV |
| <input type="checkbox"/> 160 Stockholders' Suits | <input type="checkbox"/> 360 Other Personal Injury | Habeas Corpus: | <input type="checkbox"/> 710 Fair Labor Standards Act | <input type="checkbox"/> 864 SSID Title XVI | <input type="checkbox"/> 810 Selective Service |
| <input type="checkbox"/> 190 Other Contract | <input type="checkbox"/> 441 Voting | <input type="checkbox"/> 530 General | <input type="checkbox"/> 720 Labor/Mgmt. Relations | <input type="checkbox"/> 865 RSI (405(g)) | <input type="checkbox"/> 850 Securities/Commodities/Exchange |
| <input type="checkbox"/> 195 Contract Product Liability | <input type="checkbox"/> 442 Employment | <input type="checkbox"/> 535 Death Penalty | <input type="checkbox"/> 730 Labor/Mgmt. Reporting & Disclosure Act | <input type="checkbox"/> 870 Taxes (U.S. Plaintiff or Defendant) | <input type="checkbox"/> 875 Customer Challenge 12 USC 3410 |
| <input type="checkbox"/> 196 Franchise | <input type="checkbox"/> 443 Housing/Accommodations | <input type="checkbox"/> 540 Mandamus & Other | <input type="checkbox"/> 740 Railway Labor Act | <input type="checkbox"/> 871 IRS—Third Party 26 USC 7609 | <input type="checkbox"/> 890 Other Statutory Actions |
| <input type="checkbox"/> 210 Land Condemnation | <input type="checkbox"/> 444 Welfare | <input type="checkbox"/> 550 Civil Rights | <input type="checkbox"/> 790 Other Labor Litigation | <input type="checkbox"/> 462 Naturalization Application | <input type="checkbox"/> 891 Agricultural Acts |
| <input type="checkbox"/> 220 Foreclosure | <input type="checkbox"/> 445 Amer. w/Disabilities - Employment | <input type="checkbox"/> 555 Prison Condition | <input type="checkbox"/> 791 Empl. Ret. Inc. Security Act | <input type="checkbox"/> 463 Habeas Corpus - Alien Detainee | <input type="checkbox"/> 892 Economic Stabilization Act |
| <input type="checkbox"/> 230 Rent Lease & Ejectment | <input type="checkbox"/> 446 Amer. w/Disabilities - Other | | <input type="checkbox"/> 465 Other Immigration Actions | <input type="checkbox"/> 464 Habeas Corpus - Alien Detainee | <input type="checkbox"/> 893 Environmental Matters |
| <input type="checkbox"/> 240 Torts to Land | <input type="checkbox"/> 440 Other Civil Rights | | | | <input type="checkbox"/> 894 Energy Allocation Act |
| <input type="checkbox"/> 245 Tort Product Liability | | | | | <input type="checkbox"/> 895 Freedom of Information Act |
| <input type="checkbox"/> 290 All Other Real Property | | | | | <input type="checkbox"/> 900 Appeal of Fee Determination Under Equal Access to Justice |
| | | | | | <input type="checkbox"/> 950 Constitutionality of State Statutes |

V. ORIGIN

(Place an "X" in One Box Only)

- 1 Original Proceeding
- 2 Removed from State Court
- 3 Remanded from Appellate Court
- 4 Reinstated or Reopened
- 5 Transferred from another district (specify)
- 6 Multidistrict Litigation
- 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION

Cite the U.S. Civil Statute under which you are filing (Do not cite jurisdictional statutes unless diversity): 35 U.S.C. 271

Brief description of cause: Action for infringement of U.S. Letters Patent

VII. REQUESTED IN COMPLAINT:

- CHECK IF THIS IS A CLASS ACTION UNDER F.R.C.P. 23
- DEMAND \$ To Be Determined
- CHECK YES only if demanded in complaint: JURY DEMAND: Yes No

VIII. RELATED CASE(S) IF ANY

(See instructions):

JUDGE _____

DOCKET NUMBER _____

DATE

7/18/11

SIGNATURE OF ATTORNEY OF RECORD

s/T. Wickham Schmidt

FOR OFFICE USE ONLY

RECEIPT # _____

AMOUNT _____

APPLYING JEP _____

JUDGE _____

MAG. JUDGE _____

Case 1:11-cv-00685-WCG Filed 07/18/11 Page 1 of 2 Document 1-4

INSTRUCTIONS FOR ATTORNEYS COMPLETING CIVIL COVER SHEET FORM JS 44

Authority For Civil Cover Sheet

The JS 44 civil cover sheet and the information contained herein neither replaces nor supplements the filings and service of pleading or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. Consequently, a civil cover sheet is submitted to the Clerk of Court for each civil complaint filed. The attorney filing a case should complete the form as follows:

I. (a) Plaintiffs-Defendants. Enter names (last, first, middle initial) of plaintiff and defendant. If the plaintiff or defendant is a government agency, use only the full name or standard abbreviations. If the plaintiff or defendant is an official within a government agency, identify first the agency and then the official, giving both name and title.

(b) County of Residence. For each civil case filed, except U.S. plaintiff cases, enter the name of the county where the first listed plaintiff resides at the time of filing. In U.S. plaintiff cases, enter the name of the county in which the first listed defendant resides at the time of filing. (NOTE: In land condemnation cases, the county of residence of the "defendant" is the location of the tract of land involved.)

(c) Attorneys. Enter the firm name, address, telephone number, and attorney of record. If there are several attorneys, list them on an attachment, noting in this section "(see attachment)".

II. Jurisdiction. The basis of jurisdiction is set forth under Rule 8(a), F.R.C.P., which requires that jurisdictions be shown in pleadings. Place an "X" in one of the boxes. If there is more than one basis of jurisdiction, precedence is given in the order shown below.

United States plaintiff. (1) Jurisdiction based on 28 U.S.C. 1345 and 1348. Suits by agencies and officers of the United States are included here.

United States defendant. (2) When the plaintiff is suing the United States, its officers or agencies, place an "X" in this box.

Federal question. (3) This refers to suits under 28 U.S.C. 1331, where jurisdiction arises under the Constitution of the United States, an amendment to the Constitution, an act of Congress or a treaty of the United States. In cases where the U.S. is a party, the U.S. plaintiff or defendant code takes precedence, and box 1 or 2 should be marked.

Diversity of citizenship. (4) This refers to suits under 28 U.S.C. 1332, where parties are citizens of different states. When Box 4 is checked, the citizenship of the different parties must be checked. (See Section III below; federal question actions take precedence over diversity cases.)

III. Residence (citizenship) of Principal Parties. This section of the JS 44 is to be completed if diversity of citizenship was indicated above. Mark this section for each principal party.

IV. Nature of Suit. Place an "X" in the appropriate box. If the nature of suit cannot be determined, be sure the cause of action, in Section VI below, is sufficient to enable the deputy clerk or the statistical clerks in the Administrative Office to determine the nature of suit. If the cause fits more than one nature of suit, select the most definitive.

V. Origin. Place an "X" in one of the seven boxes.

Original Proceedings. (1) Cases which originate in the United States district courts.

Removed from State Court. (2) Proceedings initiated in state courts may be removed to the district courts under Title 28 U.S.C., Section 1441. When the petition for removal is granted, check this box.

Remanded from Appellate Court. (3) Check this box for cases remanded to the district court for further action. Use the date of remand as the filing date.

Reinstated or Reopened. (4) Check this box for cases reinstated or reopened in the district court. Use the reopening date as the filing date.

Transferred from Another District. (5) For cases transferred under Title 28 U.S.C. Section 1404(a). Do not use this for within district transfers or multidistrict litigation transfers.

Multidistrict Litigation. (6) Check this box when a multidistrict case is transferred into the district under authority of Title 28 U.S.C. Section 1407. When this box is checked, do not check (5) above.

Appeal to District Judge from Magistrate Judgment. (7) Check this box for an appeal from a magistrate judge's decision.

VI. Cause of Action. Report the civil statute directly related to the cause of action and give a brief description of the cause. **Do not cite jurisdictional statutes unless diversity.** Example: U.S. Civil Statute: 47 USC 553

Brief Description: Unauthorized reception of cable service

VII. Requested in Complaint. Class Action. Place an "X" in this box if you are filing a class action under Rule 23, F.R.Cv.P.

Demand. In this space enter the dollar amount (in thousands of dollars) being demanded or indicate other demand such as a preliminary injunction.

Jury Demand. Check the appropriate box to indicate whether or not a jury is being demanded.

VIII. Related Cases. This section of the JS 44 is used to reference related pending cases if any. If there are related pending cases, insert the docket numbers and the corresponding judge names for such cases.

Date and Attorney Signature. Date and sign the civil cover sheet.

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
---	---

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Wisconsin on the following

Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 11-C-685	DATE FILED 7/18/2011	U.S. DISTRICT COURT Eastern District of Wisconsin
PLAINTIFF Encap LLC		DEFENDANT The Scotts Company LLC et al
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 6,209,259	4/3/2001	ENCAP LLC
2 7,412,878	8/19/2008	ENCAP LLC
3 6,745,513	6/8/2004	ENCAP LLC
4		
5		

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY		
	<input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading		
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK	
1			
2			
3			
4			
5			

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK JON W. SANFILIPPO	(BY) DEPUTY CLERK A. Wachtendonck	DATE 7/19/2011
----------------------------	--------------------------------------	-------------------

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
 Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy