Genetically Engineered Plants, Gene Expression, Related Products

BTI-61PCT

In re Application of:	Klessig and Kumar
Assignee:	Boyce Thompson Institute for Plant Research, Inc.
Patent No.:	NA
Serial No.:	956507PCT/US0226312
Filed:	August 16, 2001
Priority date:	NA
For:	**SALICYLIC ACID-BINDING PROTEIN (SABP2) AND METHODS OF USE THEREOF**

Status

Pending. Filed PCT application August 16, 2002, selected US only on February 16, 2004.

Related Files or Patent Applications

None.

Summary of Technology

This application discloses novel nucleic acid molecules encoding SA-binding proteins involved in SA-mediated disease resistance responses are disclosed. Methods of use of the nucleic acid molecules and proteins of the invention are also provided.

Claim Coverage

The claims generally are directed to vectors, plants and seeds that are modified to include a DNA molecule that encodes an SA-binding protein, and related methods to enhance resistance of plant-to-plant pathogens or other disease causing agents.

BTI-60

Assignee:	Boyce Thompson Institute for Plant Research, Inc.
Patent No.:	5,861,277
Serial No.:	08/723,624
Filed:	October 2, 1996
Priority date:	NA
For:	**METHODS AND COMPOSITIONS FOR ENHANCING THE EXPRESSION OF GENES IN PLANTS**

Status

Patent issued January 19, 1999.

Related Files or Patent Applications

None pending.

Summary of Technology

This patent discloses methods of increasing exogenous protein expression in a cell or a transgenic plant. Constructs, *i.e.*, vectors, DNA fusions and polynucleotides, for use in conjunction with the methods to cause increased exogenous protein expression are also disclosed. These constructs generally include intron 1 and/or intron 2 of the PAT1 gene. Additionally disclosed are cells, including recombinant cells, and plant lines transformed with the described constructs. In particular, a cultivated, transgenic food plant, the genome of which has been augmented through the genomic introduction of a preselected exogenous protein gene not found in the genome of non-transformed parentage of the plant is described. Also described are seed, progeny and cells of the described transgenic food plant.

Claim Coverage

The claims generally are directed to methods for increasing exogenous protein expression in a genetically engineered plant or cell, comprising the steps of constructing a DNA fusion comprising intron 1 or 2 of the PAT1 gene from potato operatively linked to a polynucleotide encoding a gene of interest, and introducing the fusion construct into a plant or cell, as well as vectors, cells, plants and seeds comprising the fusion construct.

BTI-55

In re Application of:	Hugh S. Mason, Kenneth E. Palmer, Kathleen L. Hefferon, Tsafrir S. Mor, Charles J. Arntzen
Assignee:	Boyce Thompson Institute for Plant Research, Inc.
Patent No.:	6,392,121
Serial No.:	09/414,276
Filed:	October 7, 1999
Priority date:	October 7, 1998 (Ser. No. 60/103,352)
For:	**GEMINIVIRUS VECTORS FOR GENE EXPRESSION IN PLANTS**

Status
Issued.

Related Files or Patent Applications
Divisional abandoned

Summary of Technology
This application discloses a gene amplification system, based on plant virus genetic elements, which can dramatically increase foreign protein production in plants. A safer and more economical production system for expressing vaccines and antibodies in genetically engineered plants is described. The high-level expression system uses the replicative process of a plant mastrevirus, exemplified by bean yellow dwarf virus (BeYDV). The expression system is preferably inducible to avoid interference with plant growth and development. Developmental cues, such as fruit ripening, are employed to trigger expression of the foreign protein using a tissue-specific promoter. A single, stably integrated expression cassette for foreign protein is replicated extrachromosomally in ripening fruit, forming hundreds of transcriptionally competent copies. Preferred plant hosts include tomato as a model system and soybean for production of large quantities of protein at high total protein levels.

Claim Coverage
The claims generally are directed to vectors, plants and seeds that are modified to include one or more recombinant nucleic acid molecules that include at least a portion of a long intergenic region (LIR) of a geminivirus genome, and that lack a functional geminivirus coat protein coding sequence, and/or a recombinant nucleic acid molecule that includes a geminiviral replicase gene operably linked to a fruit ripening-dependent promoter, as well as methods of making transgenic plants and expressing foreign proteins in plants.

BTI-54PCT

In re Application of:	Klessig, Krachoo and Shah
Assignee:	
Patent No.:	NA
Serial No.:	PCT/US01/16134
Filed:	May 18, 2001
Priority date:	June 12, 2000 (Ser. No. 60/210,967)
For:	**FATTY ACID DESATURASE GENE AND PROTEIN FOR MODULATING ACTIVATION OF DEFENSE SIGNALING PATHWAYS IN PLANTS**

Status

Pending.

Related Files or Patent Applications

None pending; expect to file National phase applications by December 12, 2002.

Summary of Technology

This application discloses a novel plant gene, SSI2, which encodes a stearoyl-ACP desaturase in plants and plays a key role in modulating plant defense responses. Also disclosed is a FA-derived signaling molecule(s) that can be manipulated through the up- or down-regulation of the SSI2 FA desaturase, resulting in specific modifications of plant defense responses. This FA-derived signaling molecule(s) comprises at least an 18:1 FA or a derivative thereof. Mutant plants with substantially reduced SSI2 activity also are disclosed, along with transgenic plants that over- or under- express the SSI2 gene.

Claim Coverage

The claims generally are directed to plants that are modified to include a DNA molecule that encodes an SSI2, and related methods to enhance resistance of plant-to-plant pathogens or other disease causing agents.

BTI-45

In re Application of:	Mor, Mason, Soreq, Arntzen
Assignee:	Boyce Thompson Institute for Plant Research, Inc.
Patent No.:	6,770,799
Serial No.:	09/810,861
Filed:	March 16, 2001
Priority date:	March 17, 2000 (Ser. No. 60/190,440)
For:	**EXPRESSION OF RECOMBINANT HUMAN ACETYLCHOLINESTERASE IN TRANSGENIC TOMATOES**

Status

Issued, divisional filed.

Related Files or Patent Applications

BTI-45DIV, Note: this patent is shared 50/50 with Yissum (Hebrew University). They pay _ of the related expenses.

Summary of Technology

This application discloses a method of making a transgenic plant that is capable of expressing a physiologically active human acetylcholinesterase, comprising the steps of introducing into at least one plant cell a polynucleotide that encodes a human acetylcholinesterase, and regenerating from the plant cell a transgenic plant that is capable of expressing a physiologically active human acetylcholinesterase in at least one tissue type of the transgenic plant. Another embodiment of the invention includes a method of making a physiologically active human acetylcholinesterase, comprising the steps of introducing into at least one plant cell a polynucleotide that encodes a human acetylcholinesterase, regenerating from the plant cell a transgenic plant that is capable of expressing a physiologically active human acetylcholinesterase in at least one tissue type of the transgenic plant, and isolating or purifying from the transgenic plant or a part thereof a physiologically active human acetylcholinesterase.

Claim Coverage

The claims generally are directed to vectors, cells, plants and seeds comprising a polynucleotide that encodes a human acetylcholinesterase. Currently in negotiation with ASU for a marketing agreement.

BTI-84

In re Application of:	Jander and Joshi
Assignee:	Boyce Thompson Institute for Plant Research, Inc.
Patent No.:	NA
Serial No.:	60/519,313
Filed:	PCT filed November 10, 2004
Priority date:	November 10, 2003
For:	**INCREASED SEED THREONINE CONTENT THROUGH ALTERATION OF THREONINE ALDOLASE ACTIVITY**

Status
Pendng.

Related Files or Patent Applications
This patent is also filed directly in Argentina, a non-PCT country.

Summary of Technology
The present invention discloses the identification of a mutation in a threonine aldolase (gi|9802578) as the cause of high seed threonine levels in a mutant Arabidopsis line. Similar mutations or silencing of threonine aldolase gene expression could be used to increase the seed threonine levels of crop plants. Threonine is a limiting amino acid in certain grains (in particular soy) that are used as animal feed. Increased seed threonine content would eliminate the need for threonine supplementation of feed (relatively expensive) and would increase crop value.

Claim Coverage
The claims generally are directed to methods for controlling seed threonine content by alteration of threonine aldolase enzymatic activity.

Interested Parties or Potential Licensees
Exclusively option granted to Monsanto Company in exchange for payment of all related legal costs.

BTI-86

In re Application of:	VanEck and Garvin
Assignee:	Boyce Thompson Institute for Plant Research, Inc.
Patent No.:	NA
Serial No.:	60/
Filed:	December 17, 2004
Priority date:	NA
For:	**ENHANCMENT OF BETA CAROTENE IN PLANTS**

Status
Pendng.

Related Files or Patent Applications
None

Summary of Technology
The present invention relates to a nucleic acid construct configured for enhancement of beta-carotene content in plants. The inventors postulated that high zeaxanthin potato lines possess the potential to accumulate large amounts of beta-carotene in their tubers, but do not do so because of the activity of beta-carotene hydroxylase. In theory, reducing beta-carotene hydroxylase activity in such potato tubers should result in the accumulation of beta-carotene because it is the immediate precursor of zeaxanthin. RNA silencing is a means of providing specific and heritable genetic interference through the introduction into a genome of double-stranded RNA-expressing constructs (Chuang et al., "Specific and Heritable Genetic Interference by Double-Stranded RNA in *Arabidopsis thaliana*," *Proc. Nat'l. Acad. Sci. USA* 97:4985-4990 (2000); Waterhouse, et al., "Exploring Plant Genomes by RNA-Induced Gene Silencing," *Nat. Rev. Genet.* 4:29-38 (2003)). The enhancement of beta-carotene accumulation in the potato, by RNA silencing with the activity of _-carotene hydroxylase, provides the potential of increasing vitamin A intake in developing countries, and of providing a source for increased beta-carotene intake in Western diets. The present invention is directed to overcoming these and other deficiencies in the art.

Claim Coverage
The claims generally are directed to methods for enhancing the beta carotene content in plants. Potato is an example.

Interested Parties or Potential Licensees
Fully available for license.

BTI-3

In re Application of:	Leonard H. Weinstein and Arthur W. Galston
Assignee:	Boyce Thompson Institute for Plant Research, Inc.; Yale University
Patent No.:	4,818,770
Serial No.:	921,543
Filed:	October 22, 1986
Priority date:	NA
For:	**PREVENTION OF A PLANT DISEASE BY SPECIFIC INHIBITION OF FUNGAL POLYAMINE BIOSYNTHESIS**

Status

Patent issued April 4, 1989.

Related Files or Patent Applications

None pending.

Summary of Technology

This patent discloses that DL-alpha-Difluoromethylornithine (DFMO), an inhibitor of the polyamine biosynthetic enzyme ornithine decarboxylase (ODCase; EC 4.1.1.17), strongly retards the growth of several species of phytopathogenic fungi in vitro. Such inhibition can be completely reversed by putrescine or spermidine, confirming the essentiality of polyamines for growth of fungal hyphae. DFMO can protect a range of plants against a wide range of fungi. For example, DFMO can protect bean plants (*Phaseolus vulgaris* Linnaeus cv. Pinto) against infection by uredospores of the bean rust fungus, *Uromyces phaseoli* Linnaeus, race O. All concentrations of DFMO 0.50 mM or higher gave complete protection against the pathogen; at lower concentrations, postinoculation treatments with DFMO were generally more effective than preinoculation. The appearance of lesions on plants treated with lower concentration of DFMO was retarded 2-6 days. DFMO also conferred protection on unsprayed parts of treated plants, indicating the translocation of some protective effect from sprayed areas. DFMO has also been shown to be an effective synthetic fungicide for the following: protects tomato plants against *Verticillium* wilt fungus; protects wheat against stem rust fungus; protects wheat against powdery mildew fungus; protects Tendergreen bean plants against powdery mildew fungus; protects the MacIntosh apple leaf against the powdery mildew fungus; protects Ogle oats against leaf rust fungus; and protects corn against the corn rust fungus.

Claim Coverage

The claims generally are directed to a method of protecting plants against infection by fungi by applying a fungicidally effective amount of DL-alpha-Difluoromethylornithine (DFMO) to the plants.