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Gene Giants Stockpile Patents on "Climate-ready" Crops in Bid to become "Biomassters"

Patent Grab Threatens Biodiversity, Food Sovereignty

Issue: The six largest agrochemical and seed corporations are filing sweeping, multi-genome patents in pursuit of exclusive monopoly over plant gene sequences that could lead to control of most of the world's plant biomass – whether it is used for food, feed, fiber, fuel or plastics. Under the guise of developing "climate-ready" crops, the companies are pressuring governments to allow what could become the broadest and most dangerous patent claims in intellectual property history. For the Gene Giants, the goal is to become the world's "biomassters." The aim of plant breeding is no longer to feed people, but to maximize biomass.

Actors: 262 patent families (subsuming 1663 patent documents worldwide) published between June 2008 - June 2010 make specific claims to abiotic stress tolerance (such as drought, heat, flood, cold and salt-tolerance) in plants. The claims extend, in many cases, to multiple traits in scores of genetically modified crops and even to the harvested food and feed products. Just six corporations (DuPont, BASF, Monsanto, Syngenta, Bayer and Dow) and their biotech partners (Mendel Biotechnology and Evogene) control 201 or 77% of the 262 patent families (both issued patents and applications). Three companies – DuPont, BASF, Monsanto – account for 173 or 66%. The public sector has only 9%.

Impact: The patent grab on "climate ready" crops is a bid to control not only the world's food security but also the world's yet-to-be commodified biomass. In the fog of climate chaos, the Gene Giants hope to ease public acceptance of genetically engineered crops and make the patent grab more palatable. It's a fresh twist on a stale theme: Crops engineered with "climate-ready" genes will increase production and feed the world, we're told. Plants that are engineered to grow on poor soils, with less rain and less fertilizer will mean the difference between starvation and survival for the poorest farmers. To gain moral legitimacy, the Gene Giants are teaming up with high-profile philanthropists (Gates, Buffett), big governments like the USA and UK and big-box breeders (Consultative Group on International Agricultural Research) to donate royalty-free genes and technologies to resource-poor farmers – especially in sub-Saharan Africa. The *quid pro quo* is that South governments must "ease the regulatory burden" that might hinder the commercial release of transgenic crops and embrace biotech-friendly intellectual property laws.

Stakes: The global market for drought tolerance in just one crop – maize – is an estimated $2.7 billion[1] but the U.S. Department of Agriculture predicts that the global bio-based market for just chemicals and plastics will top $500 billion per year by 2025.[2]

Policy: There is no societal benefit when governments allow six corporations to monopolize food. The pretext of climate-ready genes will increase farmers' dependence on GM crops, jeopardize biodiversity, and threaten global food sovereignty. States must act at the UN/FAO Committee on World Food Security this October; at COP 10 of the UN Biodiversity Convention also in October; at the climate change negotiations in Cancún (November 2010); at the Governing Body of the International Seed Treaty meeting in Bali, Indonesia in March 2011; and at the Rio+20 Summit in Brazil in 2012.

2010 Update on Climate-Ready Crop Genes, Technologies and Related Patent Claims

Background: In mid-2008 ETC Group identified 55 patent "families" (a total of 532 patent documents) that were applied for and/or granted to BASF, Monsanto, Bayer, Syngenta, DuPont and their biotech partners on so-called "climate-ready" genes at patent offices around the world. ETC Group's 2010 update on climate ready crops casts a wider net by identifying patent documents published worldwide from June 30, 2008 to June 30, 2010. Our study examines both private and public sector claims related to abiotic stress tolerance (that is, traits related to environmental stress, such as drought, salinity, heat, cold, chilling, freezing, nutrient levels, high light intensity, ozone and anaerobic stresses). These traits will theoretically enable plants to withstand environmental stresses associated with climate change.

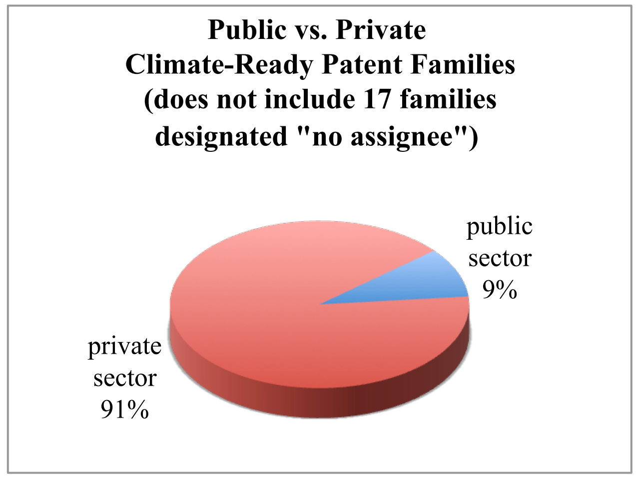
> *"Farmers around the world are going to pay hundreds of millions of dollars to technology providers in order to have this feature [drought-tolerant maize]."* – Michael Mack, CEO, Syngenta, 21 April 2010[3]

Findings: The past two years (June 30, 2008 to June 30, 2010) saw a dramatic upsurge in the number of patents published (both applications and issued patents) related to "climate-ready," genetically engineered crops. The new search yielded **262 patent families, which include 1663 patent documents** (see Appendix A).

> What is a "patent family"? A patent family contains a set of related patent applications and/or issued patents that are published in more than one country or patent office (including national and regional patent jurisdictions). Issued patents and/or applications that belong to the same family have the same inventor and they refer to the same "invention."

Note: Our findings provide a "snapshot" of the patent landscape related to climate ready genes and technologies during a specific period of time. Government patent offices issue new patent applications on a daily basis, and thus the numbers are constantly changing. Our study examines patent applications and issued patents that were published from June 30, 2008 to June 30, 2010. Our patent search was conducted in July 2010, and identifies both patent applications and issued patents with claims that specifically mention genes and technologies related to abiotic stress tolerance in plants. However, our search is not exhaustive – and it is likely that some relevant patents/applications have been overlooked.

Of the 262 patent families identified, 245 are held by 46 public & private sector institutions (this number does not include the 17 patent families for which no assignee is designated). Appendix A provides a detailed look at the patent families, patent/application titles, assignees, etc. Here's the breakdown:



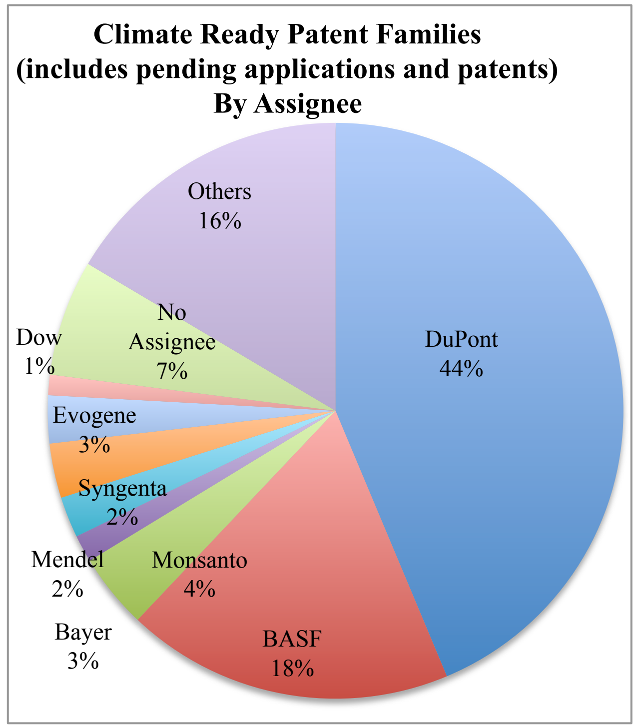
20 public sector institutions hold 23 patent families – 9% of the total. (Includes public sector assignees based in Argentina, Belgium, Canada, China, France, Germany, Netherlands, India, Israel, South Africa, Taiwan, USA.)

26 private sector assignees hold 222 patent families (91% of the total)
(This does not include the 17 patent families in the category of "no assignee")

Corporate Control: As in 2008, a small group of transnational agrochemical/seed corporations are the major players in climate ready gene patents. **The major companies and their biotech partners account for over three-quarters (201 or 77%) of the total patent families (both issued patents and applications).[4] Just three companies – DuPont, BASF, Monsanto – account for two-thirds (173 or 66%) of the total.** See chart below. The companies appear to have different strategies for developing climate-ready traits in plants. For example, DuPont holds many patents that make broad claims for generic-sounding "abiotic stress tolerance" in maize and soybean cultivars (in almost all cases these claims include both conventionally-bred and transgenic varieties), while BASF, Monsanto and their biotech partners are more likely to claim gene sequences that are found across multiple plant genomes and confer some type of abiotic stress tolerance (usually multiple stresses) in transgenic plants. Bayer and Dow (and others) are pursuing a chemical-intensive strategy (not surprisingly), claiming increased abiotic stress tolerance in transgenic plants treated with proprietary chemical/s (usually fungicides). Here's the breakdown of climate-ready patent claims by assignee (legal owner of the patent):

Climate-Ready Patent Claims
(Patents and Applications) on 262 Patent Families – includes 1663 patent documents
June 30, 2008 - June 30, 2010

Assignee	**# of patent families**	**% of total**	**total # patents & appli-cations in family(ies)**	**# of issued patents within family**
DuPont	114	44%	240	104
BASF (includes CropDesign and Metanomics)	48	18%	522	53
Monsanto (collaborates w/ BASF)	11	4%	122	3
Mendel Biotechnology (partners w/ Monsanto and others)	4	2%	232	21
Syngenta	6	2%	39	2
Evogene (partners w/Bayer; Monsanto Dupont; Limagrain)	8	3%	64	1
Bayer	7	3%	43	2
Dow	3	1%	18	1
No Assignee	17	7%	99	5
Total Others	43	16%	272	28
TOTAL	262	100%	1663	221



Profile of Major Players

R&D on climate ready crops is not limited to food and feed crops – the major players also support research related to biofuels and industrial feedstocks (i.e., biomass). A profile of major players reveals a tangled web of partnerships among Gene Giants and between these corporations and their biotech partners:

In 2007 **BASF** and **Monsanto** initiated the world's largest agricultural research collaboration, jointly investing $1.5 billion to develop stress-tolerant maize (corn), soybean, cotton and canola crops. In July 2010 BASF and Monsanto announced an additional investment of $1 billion – which now extends to abiotic stress tolerance in wheat – the world's second most valuable crop commodity after maize.[5] To punctuate the deal, Monsanto announced in August 2010 that it would acquire a 20% stake in Australia's largest wheat-breeder, the state-owned Intergrain. The equity stake gives Monsanto "a vast new library of germplasm."[6] Monsanto and BASF claim that the world's first-ever genetically engineered, drought-tolerant maize variety will be the first product to emerge from their joint pipeline – scheduled for commercial release around 2012. The companies claim that field tests of drought-tolerant maize in drought-prone areas of the USA's western Great Plains "met or exceeded" expectations – with yield increases of about 7 to 10% over average yields.[7] Monsanto also is engineering drought tolerant cotton, wheat and sugar cane.

In January 2010 **BASF** announced a new collaboration with KWS (Germany-based, top 10 seed company) to develop sugar beets with improved drought tolerance and 15% higher yield. Agrofuels – including genetically modified trees – are one of the big targets: BASF also collaborates with **Brazil's Centro de Tecnologia Canavieira** (CTC) to develop sugarcane with better drought tolerance and 25% higher yield.[8]

Mendel Biotechnology is a major player in climate-ready crop genes. According to Mendel's website, Monsanto is the "most important customer and collaborator for our technology business." Mendel has been collaborating with Monsanto since 1997. Under the terms of the current agreement, Monsanto has **exclusive** royalty-bearing licenses to Mendel technology in certain large-acreage crops and vegetables. Mendel's other big partners are BP and Bayer. Mendel is working with Bayer to develop chemical products that regulate plant stress tolerance. Since 2007, Mendel has been working with BP on second-generation biofuels ("BioEnergy Seeds and Feedstocks"). The focus of the collaboration is the development and commercialization of dedicated energy crops such as Miscanthus and switchgrass. Mendel also works with Arborgen on GE trees.

DuPont (Pioneer Hi-Bred) refers to its work on drought tolerance technologies as "the next great wave of agricultural innovation."[9] Pioneer's vice-president for biotech and regulatory affairs, Jeffrey Rowe, points out that, unlike the company's major competitors, Pioneer started off as a seed company (that was later acquired by a chemical company), and that Pioneer has been conducting research on drought tolerant maize for the past 60 years.[10] "We have such a rich base of proprietary germplasm – other companies wouldn't have nearly the richness in germplasm," explains Rowe. Although the company was initially skeptical about drought tolerance, according to Rowe, "what you're seeing now is a continuing and growing sense of confidence that what we have is real. We continue to grow in confidence in this trait [drought tolerance]."[11]

"Biomass" refers to material derived from living or recently-living biological organisms: including all plants and trees, microbes, as well as by-products such as organic waste from livestock, food processing and garbage. ETC Group's forthcoming report, *The New Biomassters*, warns that the bio-economy is a catalyst for the corporate grab on all plant matter and the destruction of biodiversity on a massive scale. With extreme genetic engineering, the world's largest corporations are poised to manufacture industrial compounds – fuel, food, energy, plastics and more – using biomass as the critical feedstock. In the name of moving "beyond petroleum," the "Biomassters" are poised to appropriate and further commodify plant matter in every part of the globe – without addressing the root causes of climate change. www.etcgroup.org

A note on terminology: The term "gene" refers to the physical and functional unit of heredity. The correlation between a *trait* and a *gene* is complex – and there is a great deal of uncertainty surrounding this concept. Most plant traits are governed by more than one gene. A gene is an ordered sequence of nucleotides located in a particular position on a particular chromosome (and can exist in a series of alternative forms called alleles) that encode a specific functional product (i.e., a protein or RNA molecule). The combination of genes is one determinant for the development of a plant's traits.

Pioneer focuses on both conventional breeding as well as transgenics. And, in contrast to the other Gene Giants, Pioneer claims that it supports "by far the largest in-house effort" to achieve drought tolerance. Pioneer also collaborates with Israeli biotech company, **Evogene**, on maize and soybean drought stress and with **Arcadia Biosciences**.[12] In August 2010 Evogene revealed its "Athlete 3.0" – a proprietary computational technology for "cross-species discovery of genes, based on genomic data of over 130 plant species."[13] The company claims it holds over 1,500 novel genes for key plant traits. Pioneer has licensed exclusive rights to certain genes discovered by Evogene.

Arcadia Biosciences (Davis, California), founded in 2002, is collaborating with some of the world's largest seed companies to develop genetically engineered, stress-tolerant crops. Although Arcadia is privately held, BASF's venture capital fund has invested in the company since 2005. In 2009, Vilmorin (world's 4th largest seed company, owned by Groupe Limagrain) and Arcadia entered a partnership for the development of nitrogen use efficient wheat. In May 2010, Vilmorin announced an equity investment in Arcadia (7.25%). Arcadia has agreements with Monsanto, DuPont, Vilmorin, Advanta (India) and the U.S. Agency for International Development (USAID) on projects related to nitrogen use efficiency, drought and salinity tolerance. (The company has licensed the use of its nitrogen use efficiency technology for genetically engineered crops at least 40 times, for virtually all major crops "in most countries of the world."[14]) Arcadia's president, Eric Rey (formerly an executive of Calgene – now owned by Monsanto), promotes the controversial idea that Chinese farmers who grow genetically engineered crops that theoretically require less fertilizer ("nitrogen use efficiency" – NUE) should earn carbon credits (offsets) from the United Nations' Clean Development Mechanism (or other carbon markets) for reducing greenhouse gas emissions. In 2008, Rey explained, "It's a way for farmers, and us, to make money, while doing something positive to help the environment."[15] To date, global carbon markets do not award credits for GM crops. Although the company has not yet developed an approved methodology to substantiate that its genetically engineered crops reduce emissions, Rey says there is "huge momentum" to develop carbon credits for agriculture – especially in the United States.[16]

Syngenta unveiled its first generation drought-tolerant maize ("water optimized hybrids") in July 2010. The company's "Agrisure Artesian Technology" is the result of conventional breeding (non-transgenic). According to Syngenta, the product offers the "potential to deliver 15% yield preservation under drought stress" and will be sold in the U.S. western "corn belt" region. The company claims it is the first to market "an abiotic stress solution to help growers deal with drought conditions."[17] Syngenta predicts that its second-generation maize hybrids – genetically engineered for drought tolerance – will be available post-2015, pending regulatory and import market approvals.[18]

Dow Agrosciences is pursuing a different strategy – focusing primarily on fertilizer efficiency. The World Business Council for Sustainable Development (WBCSD – "the leading business voice at climate negotiations"), showcases Dow's new technologies for "tackling climate change on the ground."[19] Dow claims that two of its new products, N-Serve® nitrogen stabilizer and Instinct™ nitrogen stabilizer, will help reduce greenhouse gas emissions related to fertilizers. The products control the bacteria that convert nitrogen during nitrification, reportedly decreasing the amount of wasted nitrates that enter the atmosphere or leach into groundwater and waterways.

Multi-Genome Patent Claims… and Beyond:
Many patent claims related to climate-ready DNA are sweeping in scope. As we reported in 2008, most of the Gene Giants are staking claims on key nucleotide sequences – trying to convince patent examiners that the same bits of DNA identified in one plant are responsible for endowing similar traits across other plant genomes (known as homologous DNA). Because of the similarity in DNA sequences between individuals of the same species or among different species – "homologous sequences" – the companies seek monopoly protection that extends not just to stress tolerance in a single engineered plant species, but also to a substantially similar genetic sequence in virtually all transformed plants. Armed with genomic information, Gene Giants are making claims across species, genera and classes.

After 8 years of mapping and sequencing the DNA of plant genomes – there's plenty of "code" (nucleotide bases and amino acid sequences) that's up-for-grabs.[20] The genomes of thousands of living organisms have been sequenced since 1995,[21] but a relatively small fraction of those have been the genomes of land-based plants. This is due, in part, to an unexpected technical hurdle: for some domesticated crops the size of the genome is more than five times bigger than the human genome.[22] In 2002, the first plant genome to be fully sequenced and published was *Arabidopsis thaliana*, a small flowering plant of mustard family with a simple structure and small genome of ~120 megabases (Mb). The plant is widely used as a model plant in research. (Genome size is often measured in millions of base pairs [pairs of nucleotide bases], or megabases.)

In 2002, rice (*Oryza sativa*) was the second plant genome to be published, the first major crop genome to be fully sequenced, and the first food crop genome. (Both subspecies of rice, *Oryza sativa japonica* and *Oryza sativa indica* have now been sequenced.) The rice genome contains about ~ 466 Mb.[23]

The rice genome quickly became the target of monopoly claims. Although the genomic information was deposited in public databases, that didn't stop it from being privatized.[24] The patent grab on key gene sequences in the world's major crops is neither trivial nor theoretical. A decade ago, genomic companies and Gene Giants were routinely filing "bulk" claims on huge numbers of DNA and amino acid (i.e., protein) sequences – over 100,000 in some cases – without specific knowledge of their function.[25]

In 2006, Cambia, an independent non-profit that promotes transparency in intellectual property, used its Patent Lens project to conduct an in-depth analysis of U.S. patents and patent applications that make claims on the rice genome.[26] Patent Lens revealed that, by 2006, roughly **74%** of the rice genome (*Oryza sativa*) was named in the claims of U.S. patent applications – due, in large part, to bulk sequence applications. They discovered that **every** segment of the rice genome's 12 chromosomes was recited in patent applications – including many overlapping claims. Patent Lens' remarkable visual display is available here.

The key players in rice genome patent claims? No surprise: DuPont, Monsanto, Syngenta, BASF, Bayer.[27] Fortunately, Cambia's 2006 analysis concluded that the corporate quest to win monopoly patents on molecular-level chunks of the world's most important food crop had only partially succeeded – *so far* – and that most of the rice genome remains in the public domain. That's due, in part, to recent decisions (by courts and patent offices) that attempt to restrict the number of DNA sequences claimed in a single patent application. Cambia's Patent Lens is now updating its patent landscape on rice, and plans to provide an updated patent landscape for other major crops as well.

New Rulings Attempt to Curb Monopoly Claims on DNA Sequences

In 2001 the U.S. PTO put a brake on "bulk claims" by issuing new guidelines requiring that claimed inventions must have "well-established" utility (one of the standard patent criteria).[28] In 2007 the U.S. PTO took another step away from bulk claims on gene sequences by issuing a notice that gave patent examiners the option of restricting claims to only a single nucleotide sequence in each patent application.[29] (Although the examiner has the option of examining more than one sequence if s/he deems it appropriate.) As a result of these changes, U.S. patent examiners are less likely to grant patents on more than a few DNA sequences at one time.

In July 2010, Europe's highest court – the European Court of Justice (ECJ) of the EU – made a ruling that significantly restricts the reach of agricultural biotech patents on DNA sequences – and specifically reigns in the breadth of Monsanto's monopoly on herbicide tolerant soybeans.[30] (Background: The ECJ's decision was based on Monsanto's lawsuit against Dutch importers of soy meal from Argentina that contains patented DNA.[31] Monsanto's herbicide tolerant soybean is widely grown in Argentina, but the company doesn't win royalties there because Monsanto's patents aren't recognized under Argentine law. Hoping for downstream rewards, Monsanto charged that European importers of Argentine soy meal were infringing the company's patent because Monsanto's patented DNA was present in the imported soy.)

The Court's decision makes clear that claims on DNA sequences will *not* extend to derivative or processed products, even if the patented DNA sequence is still present in those products.[32] The European Court affirmed that the purpose (function) of the DNA sequence must be disclosed in the patent, and protection of the sequence is limited to those situations in which the DNA is performing the function for which it was originally patented.

Recent rulings to restrict monopoly claims on DNA sequences are significant, and a major upset for Monsanto, but that hasn't stopped the scramble for gene-based patents. In the words of one patent lawyer, "The challenge for patentees in this area will be to find alternative ways to protect these products."[33]

Patent Lens points out that patent lawyers routinely use tricks of the trade to broaden the scope of claims beyond the actual DNA sequences that are specified. Companies are broadening claims by using highly complex and technical language that is designed to capture multiple gene sequences and/or amino acids that code for proteins. Patent Lens provides specific examples of broadening language here.

For example, a company may dramatically broaden the scope of its claim by using "percent identity language." The claim includes not only the sequence of interest, but any sequence that is, for example, 70, 80, or 90% identical to that sequence. According to Patent Lens, this technique "dramatically broadens the scope of the claim" by increasing the number of individual sequences that meet the criteria of the claim.

Another strategy for broadening language, according to Patent Lens, is to provide the sequence identification number (SEQ ID NO) of an amino acid and word the claim so that any nucleotide sequence that encodes that amino acid sequence is claimed.[34] Nucleotide and/or amino acid sequences as defined by the U.S. Patent and Trademark Office consist of "an unbranched sequence of four or more amino acids or an unbranched sequence of ten or more nucleotides."[35] (Note: Patent applications which disclose nucleotide or amino acid sequences disclose them in a section entitled "Sequence Listing," and each sequence is assigned a separate Sequence Identification Number [SEQ ID NO]. By international treaty, other major patent offices use substantially the same system.)

Although some of the most egregious examples of sweeping patent claims identified by ETC Group are found in patent applications that have not yet been issued, there's plenty of reason to be concerned. According to Patent Lens, applications alone may be used to scare off potential infringers, or used as leverage in licensing negotiations.[36] Because of "provisional patent rights," even a patent that has not issued can be a significant deterrent to competitors. In the USA and some other countries, the patent holder may be able to demand royalties from someone who uses the subject matter of a patent application if the patent is later granted. According to Patent Lens, if "the claims in the granted patent are substantially identical to the claims in the application, the patentee has the option to collect royalties retroactively to the publication date of the patent." In other words, the mere existence of the designation "patent pending" is a powerful deterrent that may discourage others from using, making or selling a technology that is claimed in a patent application.[37]

Despite changes in rules governing the patenting of gene sequences, the practice of over-reaching patent claims and unjust monopolies is far from over.

Patent applications – why worry? It's not unusual for Gene Giants to seek the broadest possible claims for their "inventions." Some people caution that it's premature to worry about over-reaching applications because patent attorneys typically "claim the moon" and later scale back by modifying the initial application. This may be true in some cases – but there's plenty of reason for concern. Corporate patent attorneys are handsomely rewarded to stake sweeping claims that capture the broadest monopoly possible. And they often succeed. Once a patent is granted, most patent regimes favor the rights of the patent holder – not the public good. ETC Group recalls that it took 13 years to defeat Monsanto's European Patent on ALL genetically modified soybeans![38] It took more than a decade (half the term of the patent!) to defeat an unjust U.S. patent on Mexico's yellow bean.[39] Any patent regime that takes over a decade to correct an obvious wrong is broken beyond repair and can hardly be considered "self-correcting."

A few striking examples of patents and patent applications related to climate-ready genes and technologies:

In February 2010, Mendel Biotechnology, Inc. (USA) won U.S. patent 7,663,025 "Plant Transcriptional Regulators," – a patent monopoly that includes 224 family members. In other words, Mendel has applied for or been granted patents on the same "invention" (including different steps in the application process) 224 times – including foreign filings: the European Patent Office (EPO), the World Intellectual Property Organization (WIPO), and at national patent offices in Mexico, Brazil, Australia, Canada, Japan and South Africa. Mendel obviously considers its technology a key "invention;" the company has already shelled out millions of dollars on patent fees. The patent claims transcriptional regulators[40] (a class of genes that control the degree to which other genes in a cell are activated) that reportedly confer improved tolerance in genetically engineered plants – not for a single abiotic trait – but for increased tolerance to drought, shade, and low nitrogen conditions. The claims extend far beyond a single plant species – to virtually any transgenic plant and seed that expresses the DNA sequence encoding a specified DNA sequence— "any transgenic plant that comprises a recombinant polynucleotide encoding SEQ ID NO: 8."

Claim 8. A transgenic plant that comprises a recombinant polynucleotide encoding SEQ ID NO:

Claim 9. The transgenic plant of claim 8, wherein expression of SEQ ID NO: 8 in the transgenic plant confers to the transgenic plant increased tolerance to hyperosmotic stress, drought, low nitrogen conditions or cold, as compared to a control plant.

Claim 10. A transgenic seed produced from the transgenic plant of claim 8.

BASF holds U.S. Patent 7,619,137 entitled "Transcription factor stress-related proteins and methods of use in plants" which contains 55 family members. The patent claims increased tolerance to environmental stress including salinity, drought and temperature. It's a classic example of multi-genome plant patent claims. The claims extend to transgenic plants transformed with isolated DNA sequences that confer increased tolerance to environmental stress, as compared to a wild type variety of the plant. The claims extend to virtually all flowering plants – transgenic plants that are either monocots or dicots – including maize, wheat, rye, oat, triticale, rice, barley, soybean, peanut, cotton, rapeseed, canola, manihot, pepper, sunflower, tagetes, potato, tobacco, eggplant, tomato, Vicia species, pea, alfalfa, coffee, cacao, tea, Salix species, oil palm, coconut, perennial grasses, and a forage crop plant. (See claims 7-9.)

Another U.S. patent assigned to **BASF**, U.S. Patent 7,714,190, is similar in its multi-genome claims. The patent claims extend to transgenic plants (and seeds) transformed with isolated DNA sequences that reportedly endow plants with increased tolerance to environmental stress (compared to a non-engineered variety of the plant). The claims on isolated DNA sequences that confer the increased tolerance in transgenic plants extend to multiple plant genomes: including maize, wheat, rye, oat, triticale, rice, barley, soybean, peanut, cotton, rapeseed, canola, manihot, pepper, sunflower, tagetes, solanaceous plants, potato, tobacco, eggplant, tomato, Vicia species, pea, alfalfa, coffee, cacao, tea, Salix species, oil palm, coconut, and perennial grass.

Claims extending to harvested materials:
On 18 February 2010 WIPO published Monsanto's international patent application (WO2010019838A2) entitled "stress tolerant transgenic crop plants" (It describes novel proteins derived from bacterial cold shock proteins, which upon expression in transgenic plants provide the plants with enhanced stress tolerance, e.g. heat tolerance, salt tolerance, and drought tolerance). The application makes extremely broad claims, not just to the modified plant cells in soybean, corn, canola, rice, cotton, barley, oats, alfalfa, sugarcane, turf grass, cotton, and wheat that exhibit improved stress tolerance – ***but also to the processed plant product derived from the transgenic plant*** – including "feed, a meal, a flour, an extract, or a homogenate, wherein said feed, meal, flour, extract, or homogenate is obtained from at least one plant part." In other words, Monsanto is seeking patent monopoly on the food, feed and grain products that are derived from its genetically modified stress tolerant plant! View the claims here:
(See especially, claims 25-36.)

Monsanto's patent application is not unique in the reach of its claims. **Ceres, Inc. applied for a U.S. patent (US20090094717A1) in April 2009** for nucleotide sequences and corresponding polypeptides that are responsible for modifying a plant's characteristics. (Ceres has a partnership with Monsanto and several other public and private firms.) Instead of specifying abiotic stress traits – Ceres, Inc. is going after the whole banana. Here's the laundry list of possible modulated characteristics that are claimed in its application: Claim 5: *The method of claim 4, wherein the modulated plant growth, development or phenotype characteristics comprise a modulation in any one of plant size, plant height, plant strength, vegetative growth, color, plant architecture, amount of branching, branching angle, branching length, number or leaves per branch, organ number, organ size, organ shape, leaf shape, leaf structure, leaf size, leaf number, leaf angle, biomass, sterility, seedling lethality, seed weight, seed size, seed color, seed yield, seed germination, seed content, seed structure, seed carbon content, seed nitrogen content, seed fiber content, fruit composition, fruit shape, fruit size, fruit length, fruit yield, silique length, silique shape, flower length, flower shape, flower size, inflorescence length, inflorescence thickness, cotyledon size, cotyledon number, cotyledon shape, crop development or harvest time, flowering time, senescence, time to bolting, drought or stress tolerance, biotic stress tolerance, abiotic stress tolerance, tolerance to high density plant population, tolerance to high pH, tolerance to low pH, tolerance to low nitrogen conditions, tolerance to no nitrogen conditions, tolerance to high nitrogen conditions, tolerance to nutrient limiting conditions, tolerance to oxidative stress, tolerance to cold stress, tolerance to heat stress, tolerance to saltstress, chlorophyll content, photosynthetic capacity, root growth, nutrient uptake, chemical composition, anthocyanin content, starch content, nitrogen content, internode length, hypocotyls length, ability to grow in shade, and shade avoidance as compared to the corresponding characteristics of a control plant that does not comprise said nucleic acid.*
Ceres' claims also extend to harvested food and feed products:
Claim 13. "A food product comprising vegetative tissue from a transgenic plant according to claim 9."
Claim 14. "A feed product comprising vegetative tissue from a transgenic plant according to claim 9."

Double-Dipping Monopoly? A recent U.S. patent application by **Dow Agrosciences**, US20090300980A1, makes the unusual argument that the company's genetically engineered maize plants that express an insect resistant gene *also* use nitrogen fertilizer more efficiently *and* exhibit drought tolerance. As stated in the patent, insect-resistant transgenic plants "are unexpectedly more effective at assimilating not only nitrogen but also less valuable nutrients such as phosphorous, potassium and micronutrients such as zinc."[41] Unexpectedly? Does that sound like an inventive step? The new-use-for-existing-product is striking because of its similarity to the pharmaceutical industry's strategy of claiming new uses – and therefore new patents – for existing drugs.[42]

Patents for the Poor! Public/Private Partnerships for the development of climate-ready crops:

To gain desperately needed moral legitimacy, Gene Giants like Monsanto, BASF, Syngenta and DuPont are forging high-profile partnerships with public sector institutions that aim to deliver proprietary technologies to resource-poor farmers. (The strategy is not new – remember Golden Rice? – but the partnerships are proliferating.) The public/private partnerships are hosted by a growing web of South-based non-profit institutions (funded in the North) that exist primarily to *facilitate and promote* the introduction of genetically engineered crops. The immediate impact of these partnerships is to enhance the public image of Gene Giants that are donating royalty-free genes to needy farmers. But the longer-term goal is to create the "enabling environments" (biosafety regulations, intellectual property laws, positive media coverage to promote public acceptance) that will support the market introduction of genetically engineered crops and related technologies. It's a package deal – wrapped in a philanthropic façade – and it comes with strings attached. The development of abiotic stress tolerance in crops (including conventionally-bred and transgenic varieties) is a key feature of many partnerships. For example:

"What we need in order to effectively contribute…are enabling business environments." - Gerald Steiner, Executive Vice President, Sustainability and Corporate Affairs, Monsanto Company, testifying before the U.S. Congress, July 2010.[43]

The Nairobi-based **African Agricultural Technology Foundation** (AATF) is one of the primary deal-brokers in the South. Launched in 2003, AATF is a non-profit organization that promotes public/private partnerships to ensure that resource-poor African farmers have royalty-free access to proprietary agricultural technologies that improve their productivity. Start-up funds were provided by the Rockefeller Foundation, the U.S. Agency for International Development, and the U.K.'s Department for International Development (DFID). Two of AATF's five projects are dedicated to the development of abiotic stress tolerance in crops: 1) Water efficient maize for Africa (WEMA); 2) Rice varieties suitable for soils that are low in nitrogen, and for drought and saline tolerance. See details below.

In addition to its role as African-based broker of public/private deals, AATF aims to "continuously monitor and document the evolution of regulatory frameworks for GM crops in African countries." AATF plays a major role in *promoting and facilitating* regulatory frameworks, by influencing public opinion and "overcoming the misconceptions about genetically modified organisms that slow down the adoption of biotechnology products" in Africa.[44] In August 2009, for example, WEMA's partners hosted a 4-day workshop on private sector confidentiality agreements (facilitated by Monsanto and CGIAR's Advisory Services on Intellectual Property). At the same workshop, the International Service for the Acquisition of Agri-biotech Applications (ISAAA – an industry-supported biotech advocacy group), facilitated discussions on "effective" biotech communication and "sound" media relations. In January 2010, WEMA hosted a workshop for East African journalists to build capacity for reporting on biotechnology.

Water Efficient Maize for Africa (WEMA) is one of AATF's five projects. The public/private partnership involves Monsanto; BASF; the CGIAR's flagship research center – the International Maize and Wheat Improvement Center (CIMMYT); and national agricultural research systems in Kenya, Mozambique, South Africa, Tanzania and Uganda. Launched in 2008 with $47 million from the Bill & Melinda Gates Foundation and the Howard G. Buffett Foundation, WEMA's goal is to develop new drought-tolerant maize varieties that are adapted to African agro-ecologies using conventional breeding as well as transgenics. In addition to proprietary germplasm, advanced breeding tools and expertise, Monsanto and BASF announced in March 2008 the donation of royalty-free drought-tolerant transgenes – "the same water-use efficiency genes being developed for commercial global markets." Monsanto describes its donation as a "gem" in its technology pipeline and predicts it could result in new white maize varieties that increase yields 20-35 percent during moderate drought.[45] In June 2008 Monsanto's CEO Hugh Grant ramped up the rhetoric – pledging that his company would not only double crop yields in corn, soybeans and cotton by 2020, but also help improve farmers' lives, "including an additional five million people in resource-poor farm families by 2020."[46]

What has WEMA accomplished since 2008? According to AATF, during the project's first two years, more than 60 scientists have worked together to build "the necessary scientific testing, regulatory procedures and protocols for the proper evaluation of the maize in this project within each of the five countries."[47] Non-transgenic water-efficient maize varieties (conventionally-bred) are now in the second year of field trials in Kenya and Uganda, and Tanzania recently planted trials for the first time.

As of September 2010, South Africa is the only one of five WEMA countries to conduct field trials of transgenic, drought tolerant maize. WEMA's first transgenic maize varieties were planted in November 2009 at Lutzville, a testing site in the Western Cape of South Africa, to screen for drought-tolerance performance under both optimum and low soil nitrogen. According to AATF, "In the next 12 months pending necessary regulatory approvals, it is expected scientists will be able to proceed with the planting of biotech trials in Kenya, Tanzania and Uganda. Mozambique will take steps towards completing the development of testing sites and secure regulatory approvals with a goal of planting in 2011." [48]

According to Grace Wachoro, Communications Officer at AATF, WEMA scientists have introduced Monsanto's drought tolerant gene in adapted African maize lines that will undergo "preliminary testing" in Kenya and Uganda in late 2010.[49] She adds that "The integration of the drought gene(s) is a continuous process so that there will be a pipeline of hybrids to test in the WEMA countries throughout the project."[50] Wachoro notes that all WEMA partners are parties to the Cartagena Protocol on Biosafety and "they have all committed to building functional national biosafety frameworks for managing GMOs."[51] As of this writing, however, Uganda's government has not yet approved its biosafety bill.

> In return for the surrender of national sovereignty over intellectual property, biomass, and national food security the Gene Giants are offering to "donate" proprietary genes (for untested and unproven technologies) to resource poor farmers. No government need ever recognize patents on these genes. This offer is not only easy to refute and reject but it calls for an immediate examination of all national and international patent arrangements where such claims have been entertained.

Another AATF project related to climate-ready crops seeks to develop rice varieties suitable for soils that are low in nitrogen, and for drought and saline tolerance. The project claims that rice varieties with these traits will help African farmers increase yields by up to 30%. Partners include **U.S. AID**, **Arcadia Biosciences** (USA), National Agricultural Research Systems in **Ghana**, **Burkina Faso**, and **Nigeria**, the **International Center for Tropical Agriculture** (Colombia), and **PIPRA** (USA).[52] Arcadia will provide a technology license to make the new rice varieties royalty-free to smallholder African farmers.

"Improved Maize for African Soils:" In February 2010 **Pioneer (DuPont)** announced its collaboration with "Improved Maize for African Soils" (IMAS), a public-private partnership that aims to increase maize yield's in Africa by 30-50% over currently available varieties – with the same amount of fertilizer. The project is led by **CIMMYT**, with $19.5 million in grants from the **Bill & Melinda Gates Foundation** and **USAID**. Other partners include the Kenya Agricultural Research Institute (KARI) and the South African Agricultural Research Council. Maize varieties developed with the technologies and intellectual property donated by Pioneer (transgenes and molecular markers associated with nitrogen-use efficiency) "will be made available royalty-free to seed companies that sell to the region's smallholder farmers, meaning that the seed will become available to farmers at the same cost as other types of improved maize seed."[53]

Pioneer claims that it holds "a rich pipeline" of genes for nitrogen efficiency. "By applying these genes and our Accelerated Yield Technology™ resources to the IMAS effort, we will help ensure the development of improved maize lines for those who have the most to gain from using new technologies – the smallholder farmers." Technologies will be introduced in phases: Over the next four years the project will introduce conventional maize varieties (non-GM) that offer a "significant yield advantage." Varieties developed using DNA marker techniques will be introduced within approximately seven to nine years, and those with transgenic traits will be available in approximately

10 years. All of this depends, of course, on "pending product performance and regulatory approvals by national regulatory and scientific authorities" according to national laws in each country.

"IP for the Poor" is also a rallying cry at the intergovernmental level. In January 2011 the World Intellectual Property Organization (WIPO) plans to unveil a "Global Responsibility Licensing Initiative" that would allow corporations to issue free licenses in food security, health and environment technologies.[54] According to WIPO's Director General, Francis Gurry: "Essentially, voluntarily a corporation would agree to make available free of charge its technologies where they have no market—usually a humanitarian situation or where there are no consumers." [55]

The WIPO initiative was developed with input from the World Economic Forum and the Bill & Melinda Gates Foundation (among others). Perhaps this is WIPO's idea of how to implement its so-called "Development Agenda?" By casting the patent giveaway as a magnanimous act, the WIPO initiative will generate positive PR for giant corporations and implicit legitimacy for monopoly patents – even in South countries that are not obligated to recognize them. A patent is a government-granted monopoly and is valid only within its territorial boundaries (although there are some regional patent offices).[56] In reality, patents are not insurmountable obstacles for poor countries. A patented technology may be used wherever and whenever the patent monopoly is not in force – it isn't necessary to obtain a license from the patent holder.

In April 2009 the **Syngenta Foundation for Sustainable Agriculture**, and the Forum for Agricultural Research in Africa (FARA) signed a 3-year, $1.2 million agreement "to strengthen the capacity for safe biotechnology management" in Sub-Saharan Africa. The project is managed by FARA and implemented by the National Agricultural Research System in Burkina Faso, Ghana, Nigeria, Kenya, Uganda and Malawi. According to Lucy Muchoki, a Board Member of FARA, "the project stewardship capacity that will be developed will underpin future initiatives for the proper deployment of proprietary biotechnology in the selected countries. The beneficiary countries will serve as mentors for sister countries in their respective sub-regions for the safe deployment of modern biotechnology."[57] As *Ghana Web* reports, FARA is urging Ghanaians "to embrace the use and application of modern biotechnology to effectively solve food insecurity and the likely impact of climate change on farming."[58]

In 2008 **Arcadia Biosciences** (Davis, California, USA) won a 3-year, $3.6 million grant from U.S. AID to develop rice and wheat varieties that are tolerant to drought and salinity and use nitrogen more efficiently.[59] Arcadia will partner with Mahyco, an Indian seed company that is partly owned by **Monsanto**,[60] to develop and commercialize the GM varieties. The initial grant is expected to leverage an additional $18.5 million of investment. The companies will work with the Indian public sector in order "to broaden the reach" of the technology. USAID will also assist Arcadia and Mahyco to establish markets in Bangladesh or Pakistan.

Corporate Rhetoric vs. Technical Complexity: ETC Group's 2008 report on climate genes noted the technical complexity of developing transgenic plants that are engineered to withstand environmental stresses associated with climate change. A 2010 study points out: "The acclimation of plants to abiotic stress conditions is a complex and coordinated response involving hundreds of genes."[61] The authors point out that a plant's response to abiotic stress is affected by complex interactions between different environmental factors. The timing of the abiotic stress, the intensity and duration of the stress, and the occurrence of multiple stresses in the field must all be taken into consideration.

The extreme complexity of engineering abiotic traits in plants is a technical feat that far surpasses what genetic engineers have achieved over the past quarter century. Fourteen years after commercial sale of the first genetically engineered crops, the Gene Giants have brought to market only two major *single-gene* traits – herbicide tolerance and insect resistance – in a handful of countries.

Setting aside the adverse social and environmental impacts of these products, the advantages of GE crops – *even for industrial-scale farmers in the North* – are elusive. (Of course, even the biotech industry admits their products offer no benefits for consumers.) In October 2010 the *New York Times* acknowledged that industry analysts are questioning whether "Monsanto's winning streak of creating ever more expensive genetically engineered crops is coming to an end."[62] The company's newest product, "SmartStax" maize –

loaded with eight foreign genes for insect resistance and herbicide tolerance – has been deemed a commercial flop. But that's not all. A huge percentage of the global area devoted to biotech crops contains at least one engineered gene for tolerance to Monsanto's Roundup – the company's blockbuster herbicide. But Roundup-resistant weeds are popping up all over the world, a reality that is "dimming the future of the entire Roundup Ready crop franchise."[63] By 2015, an estimated 40% of all U.S. farmland planted in maize and soybeans will contain some Roundup-resistant weeds.[64] It may be bad news for farmers, but it's a bonanza for agrochemical giants. Because of the growing problem of Roundup-resistant weeds, pesticide firms are scrambling to engineer crops that will resist even more toxic herbicides (like 2,4-D). A spokesman for Syngenta told the *Wall Street Journal*: "The herbicide business used to be good before Roundup nearly wiped it out. Now it is getting fun again."[65]

The Opportunity Cost: It's not simply a matter of whether it is technically possible to engineer climate-ready crops. A bigger question looms – especially for the public/private initiatives that are investing millions to deliver proprietary, climate-ready products to the poor. What is the best use of limited resources? Proprietary research on genetically engineered abiotic stress tolerance is already diverting scarce resources away from more affordable and decentralized approaches to cope with climate change. What might 60 scientists in Africa achieve if they weren't focusing on transgenic maize?

Alternative Paths for Climate Resilience: The world cannot rely on technological fixes to solve systemic problems of poverty, hunger and climate crisis. A highly centralized agro-industrial food system controlled by a handful of corporate "BioMassters" is incapable of providing the systemic changes needed to re-structure agricultural production and reduce greenhouse gas emissions. Meanwhile, peasant farmers, civil society and social movements are actively building alternative food systems built on resilience, sustainability and sovereignty.

Climate resilience ultimately depends on agricultural biodiversity, local seed systems and agro-ecological processes in the hands of farming communities. Support is needed for breeding work with under-utilized crops and with plant diversity that offers natural tolerance to harsh conditions. Indigenous and local farming communities have developed and managed that diversity and their role in developing strategies for climate change adaptation must be recognized, strengthened and protected. Instead of being on the receiving end of corporate-inspired, high-tech "hand-outs" – farming communities must be directly involved in setting priorities and strategies for climate adaptation and mitigation.

Gene banks currently hold only a small fraction of the germplasm that will be needed for future breeding work. For example, only about one third of the species currently conserved in gene banks are classified as "landraces" (i.e., farmer's varieties) or "primitive cultivars." Minor, underutilized crop species and wild relatives are severely underrepresented. Consider the following examples:

Small farmers manage a major portion of the world's agro-biodiversity in complex agro-ecosystems that have been largely neglected or overlooked by formal sector breeders. A recent study points to home gardens as crucial reservoirs of rich agricultural biodiversity at multiple levels (i.e., wild, semi-domesticated and domesticated plants, as well as inter- and intra-specific diversity).[66] These "neglected hotspots of agro-biodiversity and cultural diversity" are a critical resource for traditional knowledge, conservation of agricultural biodiversity and climate change adaptation.[67] Gardens surveyed in Ghana, for example, reveal that home gardeners cultivate, on average, 45 species; Nepalese gardeners maintain an average 33 species; Vietnamese home gardeners cultivate 45 species.[68] Home gardens typically include plants grown for food, fodder, medicine, fuel, fiber and ornamentals.

Although natural habitats are severely threatened, indigenous peoples and farming and foraging communities actively manage wild plants and animals that provide a major – though undervalued – contribution to the world's food supply. A recent study by Zareen Bharucha and Jules Pretty reveals that the mean use is 120 wild species per community for indigenous communities in both industrialized and developing countries.[69] In 22 countries of Asia and Africa, the mean use is 90-100 wild species per location. In countries like India, Ethiopia and Kenya, aggregate country estimates reached 300-800 species. [70] Bharucha and Pretty note that wild food species "offer a potentially critical role for buffering against food stress caused by a changing climate" and – due to the innate resilience of some wild species – "they could play an increasingly important role during periods of low agricultural productivity associated with climate events."[71]

The New Delhi-based Navdanya/Research Foundation for Science, Technology and Ecology points out that traditional crops bred by farmers are the major source of traits for climate resistance.[72] In its 2009 report, *Biopiracy of Climate Resilient Crops*, Navdanya documents drought resistant rice varieties grown by traditional farmers in Uttarakhand, West Bengal, Kerala, Karnataka and flood resistant rice varieties grown in Assam, West Bengal, Orissa, Kerala and Karnataka. Saline resistant rice varieties are grown in the mangroves of Sunderban area of West Bengal, Orissa, Kerala, and northern Karnataka.

Researchers from the U.S. National Research Council asked African experts to nominate indigenous African food plants with unrealized potential that are typically overlooked by scientists, policymakers, and the world at large. They received 1,000 responses naming over 300 key plants, including more than 50 vegetables.[73] In its study on under-valued crops of the Andes, the National Research Council notes that, "traditional Andean crops have received little scientific respect, research, or commercial advancement. Yet they include some widely adaptable, extremely nutritious, and remarkably tasty foods."[74] The hidden harvest, undervalued biodiversity and the knowledge and resources of the world's indigenous and peasant farming communities must be harnessed to achieve climate security.

Conclusion

The Gene Giants are leveraging the climate crisis to win monopoly control of key crop genes and gain public acceptance of genetically engineered seeds. Instead of focusing on policies to dramatically cut consumption of fossil fuels and assist farmers with community-controlled breeding strategies – the corporate agenda focuses on proprietary, high-tech seeds that won't be accessible – or suitable for – the vast majority of the world's farmers. Genetically engineered, climate-ready crops are a false solution to climate change, and the patent grab must be stopped.

There is no societal benefit when governments allow a handful of corporations to monopolize climate-related genes and traits. Two years after our initial study on climate-ready patent claims, ETC Group's recommendations remain the same:

Suspend all patents on climate-related (e.g., abiotic stress) genes and traits and conduct a full investigation, including the potential environmental and social impacts of transgenic abiotic stress tolerant seeds.

Recognize, protect and strengthen farmer-based breeding, conservation and agro-ecological systems as a priority response for climate change survival and adaptation.

Adopt policies to facilitate farmers' access to and exchange of breeding materials and eliminate current restrictions on access to seeds and germplasm (especially those driven by intellectual property, agribusiness-inspired seed laws, trade regimes and corporate oligopoly). In the midst of a food crisis compounded by climate crisis, restrictions on access to seeds and germplasm are the last thing that farmers need in their struggle to adapt to rapidly changing climatic conditions.

Governments meeting at a series of upcoming meetings must act:

- **FAO's Committee on Food Security** (11-14 October 2010) must call for a full investigation of the patent grab on climate genes as a threat to food sovereignty, and urge member governments to support farmer-led strategies for climate change adaptation.
- Governments meeting in Nagoya, Japan for the **Tenth Conference of the Parties to the Convention on Biological Diversity** (18 - 29 October 2010) must follow suit and recognize that patents on climate-related genes and traits are a threat to biodiversity and the fair and equitable sharing of the benefits arising from the utilization of genetic resources.
- At the **Climate Change Summit (COP-16)** in Cancun, Mexico (29 November – 10 December 2010) governments must reject the corporate climate agenda as a false solution to climate change.
- **The Governing Body of the International Seed Treaty** meeting in Bali, Indonesia in March 2011 must also take action to stop the patent grab on climate-related genes and technologies as a violation of the International Treaty on Plant Genetic Resources for Food and Agriculture.

Designer DNA for Climate-Ready Crops? Biotech for "fixing" climate change is just one tool in the high-tech tool kit. Extreme genetic engineering – inspired by molecular biology, computing and engineering – is not far behind. In April 2010 synthetic biologists from the Weizmann Institute (Israel) described their initial efforts to increase crop yields by boosting the rate of carbon fixation in plants – a metabolic process in living cells that converts carbon dioxide into biologically-useful molecules.[75] The scientists honed in on 5,000 metabolically-active enzymes that are known to catalyze the process of nitrogen fixation in nature. Using mathematical models, they predicted new, faster biochemical pathways for improving the rate of carbon fixation, concluding that, "proposed synthetic pathways could have significant quantitative advantages over their natural counterparts." Synthetic biologists acknowledge that the leap from computer models to real-world applications in living plants is a daunting challenge, but they remain techno-optimists: "…our findings suggest exciting avenues of exploration in the grand challenge of enhancing food and renewable fuel production via metabolic engineering and synthetic biology."[76] The scientists have applied for patents on synthetic pathways related to carbon fixation.[77]

*Advance copies of ETC Group's new report – **The New Biomassters: Synthetic Biology and the Next Assault on Biodiversity and Livelihoods** – will be available in Nagoya at the CBD's COP 10 (18-29 October) and on ETC Group's web site: www.etcgroup.org*

Appendix A.

Patents and Patent Applications on "Climate-Ready" Plant Genes and Technology published between June 30, 2008 – June 30, 2010

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
	Academia Sinica (Taiwan)	**US20100095406A1** US20090313725A1	Method of controlling plant growth and architecture by controlling expression of gibberellin 2-oxidase	enhanced stress tolerance	2010-04-15 / 2009-10-23
	Alliance One International, Inc.	**US20100138949A1**	Tobacco cultivar AOB 171	abiotic stress	2010-06-03 / 2010-01-15
	Alliance One International, Inc.	**US20100132064A1** WO2009061422A1 US20090119806A1 US20090119791A1 US7667106 US7665472 AR0069542A1	Tobacco cultivar	Abiotic stress	2010-05-27 / 2010-01-15
	Alliance One International, Inc.	**US20100132063A1** WO2009061421A1 US20090119789A1 US20090117212A1 US7667105 US7665470 AR0070309A1	Tobacco cultivar	Abiotic stress	2010-05-27 / 2010-01-15
	Arborgen (USA)	**US20100122382A1** ZA0606198A WO05065339A3 WO05065339A2 US20060010516A1 US7598084 NZ0548845A JP2007523636T2 EP1711592A4 EP1711592A2 CN1954071A BRI0418229A BR0418229A AU4311384AA AR0047574A1	Cell cycle genes and related methods	drought tolerance; cold and frost tolerance; salt tolerance, etc. – in transgenic trees	2010-05-13 / 2009-09-09
	Arcadia Biosciences	**US7560626** ZA0804960A WO2007075925A3 WO2007075925A2 US20090288224A1 US20070157337A1 EP1968372A4 EP1968372A2 CN11346061A CA2633517AA AU6331544AA AR0058863A1	Promoter sequence obtained from rice and methods of use	reduced need for nitrogen fertilizer; *Oryza sativa* plants w/ increased biomass and seed yield	2009-07-14 / 2006-12-21
	BASF (145 patent family members)	**US7714190** WO0246442A2 WO0177356A3 WO0177356A2 WO0177355A3 WO0177355A2 WO0177354A3 WO0177354A2 WO0177311A3	GTP binding stress-related proteins and methods of use in plants	increased tolerance to environmental stress (drought or cold)	2010-05-11 / 2008-09-05

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		WO0177311A2 WO0177161A3 WO0177161A2 US20100011466A1 US20090320158A1 US20090320157A1 US20090188004A1 US20090165170A1 US20090144859A1 US20090138987A1 US20090100541A1 US20090100540A1 US20090031451A1 US20080307543A1 US20080263725A1 US20080201799A1 US20080189806A1 US20080172759A1 US20080168585A1 US20080168578A1 US20080168577A1 US20080141388A1 US20080072347A1 US20080050820A1 US20070226842A1 US20070192908A1 US20070157344A1 US20070157334A1 US20070079400A1 US20050066396A1 US20040216183A1 US20040199946A1 US20040194163A1 US20040148658A1 US20040128721A1 US20040107463A1 US20030097675A1 US20020152502A1 US20020102695A1 US20020069432A1 US20020066124A1 US20020059662A1 US7709698 US7608757 US7521598 US7521597 US7514599 US7504559 US7498482 US7495151 US7482511 US7482510 US7456337 US7442853 US7435875 US7427696 US7425666 US7399904 US7271316 US7259294 US7189893 US7179962 US7166767 US7161063 US6867351 US6818805 US6720477 US6710229 US6689939 US6677504			

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		ES2340879T3 ES2295230T3 ES2279810T3 ES2277922T3 ES2272466T3 ES2272461T3 EP2175028A2 EP2172555A1 EP2169069A2 EP1881073B1 EP1881073A3 EP1881073A2 EP1795600A3 EP1795600A2 EP1783229A3 EP1783229A2 EP1760146A3 EP1760146A2 EP1760145A3 EP1760145A2 EP1728870A3 EP1728870A2 EP1373530B1 EP1373530A2 EP1335986B1 EP1335986A2 EP1311693B1 EP1311693A2 EP1294912B1 EP1294912A2 EP1268830B1 EP1268830A2 EP1268828B1 EP1268828A2 DE60141547C0 DE60131772T2 DE60131772C0 DE60126920T2 DE60126920C0 DE60126771T2 DE60126771C0 DE60125245T2 DE60125245C0 DE60124880T2 DE60124880C0 DE60123079T2 DE60123079C0 CA2405750AA CA2405721AA CA2405708AA CA2405703AA CA2405697AA CA2404857AA AU0243190A5 AU0155261A5 AU0155250A5 AU0155249A5 AU0153247A5 AU0149941A5 AT0460491E AT0380248E AT0355383E AT0354666E AT0348181E AT0346945E AT0339509E			
	BASF	**WO2010046471A2**	Method for producing a transgenic cell with increased	abiotic stress tolerance	2010-04-29 / 2009-10-23

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
			gamma-aminobutyric acid		
	BASF	**WO2010046221A1**	Plants with increased yield	Drought of abiotic stress conditions	2010-04-29 / 2009-10-02
	BASF	**WO2010037714A1**	Method for producing a transgenic plant cell, a plant or a part thereof with increased resistance biotic stress	abiotic stress resistance	2010-04-08 / 2009-09-28
	BASF	**WO2010034681A1**	Plants having enhanced yield-related traits	drought stress, salt stress or nitrogen deficiency	2010-04-01 / 2009-09-21
	BASF	**WO2010034672A1**	Plants with increased yield	low temperature, drought or abiotic stress conditions	2010-04-01 / 2009-09-18
	BASF	**US20100071091A1** WO2007020198A3 WO2007020198A2 MX2008001513 EP2145960A1 EP1915452A2 CN11365794A CA2619411AA BRPI0614367A BRI0614367A2 AU6281420AA AR0054914A1	Nucleic acid sequences encoding proteins associated with abiotic stress response and plant cells and plants with increased tolerance to environmental stress	Abiotic stress	2010-03-18 / 2006-08-12
	BASF	**WO2009027539A2** WO2009027539A3 WO2009027313A3 WO2009027313A2 EP2195436A2 CA2697935AA CA2696869AA AR0070651A1 AR0068356A1	Method for producing a transgenic plant cell, a plant or a part thereof with increased resistance to plant disease	water deficiency resistance; drought resistance	2009-03-05 / 2008-09-01
	BASF	**WO2010023320A2** WO2010023320A3 WO2010023310A3 WO2010023310A2	Plants having enhanced yield-related traits	conditions of drought stress, salt stress or nitrogen deficiency	2010-03-04 / 2009-08-31
	BASF	**WO2010020654A2** WO2010020654A3	Plants with increased yield by increasing or generating one or more activities in a plant	transient and repetitive abiotic stress	2010-02-25 / 2009-08-19
	BASF	**WO2010020555A1**	Plants having enhanced yield-related traits	drought stress, salt stress or nitrogen deficiency	2010-02-25 / 2009-08-10
	BASF	**EP2157183A1** ZA0301579A WO0216625A3 WO0216625A2 US20080072350A1 US20040219525A1 JP2004521610T2 IL0154596A0 EP1349946A2 CN1564869A CA2420325AA BR0113512A AU1288478BB AU0188478A5	Plant polynucleotides encoding prenyl proteases	particularly drought resistence	2010-02-24 / 2001-08-27
	BASF	**WO2010012760A2** WO2010012760A3	Plants having modified growth characteristics	increased drought stress resistance, increased salt stress	2010-02-04 / 2009-07-29

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
				resistance, improved growth under conditions of nutrient deficiency	
	BASF	**WO2010007035A1**	Plants having enhanced yield-related traits	drought stress, salt stress or nitrogen deficiency	2010-01-21 / 2009-07-14
	BASF	**WO2010000794A1** 2010/000794	Plants having enhanced yield-related traits and a method for making the same by overexpressing a polynucleotide encoding a tfl1-like protein	drought stress growth conditions	2010-01-07 / 2009-07-02
	BASF	**US20100005542A1** ZA0704017A WO06044912A2 US20090031446A1 US20070294783A1 US7608759 US7423196 EP1805310A2 CN11040048A CA2582304AA BRI0517007A AU5295398AA	Scarecrow-like stress-related polypeptides and methods of use in plants	increased growth under water-limited conditions and/or increased tolerance to an environmental stress	2010-01-07 / 2009-09-11
	BASF	**US20090293148A1** ZA0709897A WO06111512A1 EP1874936A1 CN11203611A CA2604807AA AU6237317AA	Improved Methods Controlling Gene Expression	drought or other abiotic stress-induced expression	2009-11-26 / 2006-04-13
	BASF	**US7619137** WO0145495A3 WO0145495A2 WO0145494C2 WO0145494A3 WO0145494A2 WO0145493A3 WO0145493A2 WO0145492A3 WO0145492A2 US20090158461A1 US20090089891A1 US20090007296A1 US20080178356A1 US20080052792A1 US20070261131A1 US20070157343A1 US20050014265A1 US20040111768A1 US20040055032A1 US20030217392A1 US7485775 US7473819 US7439417 US7235713 US7223903 US7220896 US7164057 ES2316400T3 ES2315248T3 ES2279777T3 ES2258489T3 EP1797754A1 EP1280398B1 EP1280398A2	Transcription factor stress-related proteins and methods of use in plants	increased tolerance to environmental stress including salinity, drought and temperature	009-11-17 / 2007-10-10

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		EP1280397B1 EP1280397A2 EP1251731B1 EP1251731A2 EP1244349B1 EP1244349A2 DE60041277C0 DE60041006C0 DE60034069T2 DE60034069C0 DE60027772T2 DE60027772C0 AU0129136A5 AU0129123A5 AU0127341A5 AU0127340A5 AT0418860E AT0415812E AT0357135E AT0324780E			
	BASF	**WO2009135810A1**	Plants having enhanced yield-related traits and a method for making the same		2009-11-12 / 2009-05-04
	BASF	**WO2009106596A2** WO2009106596A3 AR0070719A1	Plants with increased yield	abiotic stress tolerance (low temperature among others)	2009-09-03 / 2009-02-27
	BASF	**EP1487979B1** WO03078629A1 US20050260754A1 EP1487979A1 DE50311850C0 DE10212892A9 DE10212892A1 CA2479409AA AU3218772BB AU3218772AA AT0440950E	Constructs and methods for the regulation of gene expression	improved protection against abiotic stress factors	2009-08-26 / 2003-03-17
	BASF	**WO2009092772A2** WO2009092772A3 AR0070260A1	Plants having enhanced yield-related traits	drought stress, salt stress or nitrogen deficiency	2009-07-30 / 2009-01-23
	BASF	**US20090172834A1** WO2007110314A3 WO2007110314A2 MX2008012252 EP2010661A2 CN11421405A CA2647115AA AR0060141A1	Proteins associated with abiotic stress response and homologs	drought, heat, cold, and/or salt tolerance	2009-07-02 / 2007-03-12
	BASF	**WO2009077611A2** WO2009077611A3 AR0069893A1	Plants with increased yield and/or increased tolerance to environmental stress	increased tolerance to environmental stress	2009-06-25 / 2008-12-19
	BASF	**US20090158454A1** WO06134162A3 WO06134162A2 MX2007015716 EP1896575A2 CN11203603A CA2612016AA AU6259019AA AR0053638A1	Lectin-like protein kinase stress related polypeptide coding nucleic acid	Increased tolerance to environmental stress consisting of drought or low temperature	2009-06-18 / 2006-06-16
	BASF	**US20090144863A1** ZA0708512A WO06094976A3 WO06094976A2	Expression enhancing intron sequences	Enhancing expression of abiotic stress resistance protein in plant	2009-06-04 / 2006-03-07

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		EP2169058A2 EP2166102A2 EP2166101A2 EP2166100A2 EP2166099A2 EP2045327A2 EP1859037A2 CN11137752A CA2599405AA AU6222012AA			
	BASF	**US20090113572A1** WO06133983A1 EP1874938A1 CN11198701A CA2606220AA AU6257101AA	Starchy-endosperm and/or germinating embryo-specific expression in mono-cotyledonous plants	abiotic stress resistance	2009-04-30 / 2006-04-13
	BASF	**EP2053057A2** WO06032708A3 WO06032708A2 EP2053057A3 EP1794184A2 CN11495507A CA2579800AA BRI0515902A AU5286428AA	Nucleic acid sequences encoding proteins associated with abiotic stress response and plant cells and plants with increased tolerance to environmantal stress	nucleic acid sequences encoding proteins that confer drought, heat, cold, and/or salt tolerance to plants	2009-04-29 / 2005-09-23
	BASF	**WO2009037279A1** WO2009037329A2 WO2009037329A3 EP2193202A2 AU8300548AA AR0068533A1	Plants with increased yield	abiotic environmental stresses	2009-03-26 / 2008-09-19
	BASF	**WO2009034188A1** CA2699066AA AU8297099AA AR0069824A1	Plants having increased yield-related traits	abiotic stress resistance, including drought stress tolerance or increased nutrient uptake efficiency	2009-03-19 / 2008-09-15
	BASF	**WO2009016232A2** WO2009016232C1 WO2009016232A8 WO2009016232A3 KR10040939A EP2183372A2 CA2697186AA AU8281698AA AR0067766A1	Plants having enhanced yield-related traits	mild drought conditions	2009-02-05 / 2008-07-31
	BASF	**WO2009003953A2** WO2009003953A3 PE0900432A1 MX9012880A KR10039364A EP2182806A2 CR0011147A CN11686683A CA2691333AA AU8270346AA AR0067376A1	Strobilurins for increasing the resistance of plants to abiotic stress	increasing abiotic stress of seeds or plants with fungicide	2009-01-08 / 2008-06-27
	BASF	**WO2008142036A2** WO2008142036C1 WO2008142036A8 WO2008142036A3 US20100162432A1 EP2074220A2 DE112008001453T5 CA2687635AA AR0066642A1	Plant cells and plants with increased tolerance and/or resistance to environmental stress and increased biomass	resistance to environmental stress (salinity, drought, temperature, etc.	2008-11-27 / 2008-05-19

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
	BASF	**WO2008142034A2** WO2008142034A3 MX9012556A EP2064330A2 CA2687627AA AR0067318A1	Plants with increased tolerance and/or resistance to environmental stress and increased biomass	abiotic stress tolerance	2008-11-27 / 2008-05-19
	BASF	**WO2008137108A2** WO2008137108A3 US20100132071A1 MX9011716A EP2069509A2 CA2685223AA AU8248189AA AR0067314A	Plants having enhanced yield-related traits	abiotic stress conditions	2008-11-13 / 2008-05-02
	BASF	**WO2008099013A1** KR9019910A EP2074219A1 CN11631868A CA2675926AA AU8214568AA	Nucleic acid sequences for regulation of embryo-specific expression in monocotyledonous plants	increased stress tolerance under stress conditions	2008-08-21 / 2008-02-15
	BASF	**WO2008095926A1** US20100105669A1 MX2009007494 EP2117307A1 CR10935A CN11605455A CL3602008A1 CA2677409AA AU8212906AA AR0065198A1	Plant health composition	enhancing plant's tolerance to biotic and/or abiotic stress	2008-08-14 / 2008-02-05
	BASF	**WO2008092935A2** WO2008092935A3 MX2009007308 EP2069507A2 DE112008000275T5 CN11605902A CA2673413AA AU8209677AA AR0065121A1	Plants having enhanced yield-related traits and/or increased abiotic stress resistance	abiotic stress resistance	2008-08-07 / 2008-01-31
	BASF Plant Science (Germany)	**EP2189524A2** WO03040171A3 WO03040171A2 US20100011465A1 US20080301835A1 US20080141389A1 US20080050820A1 US20070157345A1 US20050066396A1 US20030182692A1 US7598431 US7427698 US7399904 US7303919 US7176026 ES2335089T3 EP2138573A1 EP1451326B1 EP1451326A4 EP1451326A2 DE60234377C0 CA2466412AA AU8212062AA AT0448294E	Protein kinase stress-related polypetides and methods of use in plants	environmental stress	2010-05-26 / 2002-11-12
	Bayer	**US20090013431A1** ZA0704247A WO06045633A1 MX2007005166 EP1807519A1 CN11090971A	Stress tolerant cotton plants	abiotic stress conditions	2009-01-08 / 2005-10-27

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		BRPI0518249A AU5298784AA			
	Bayer	**EP1100936B1** WO0004173A1 US20090205069A1 US20040128704A1 US20010011381A1 US7241936 US6693185 SI1100936T1 PT1100936E JP2002520062T2 HK1038590A1 ES2317698T3 EP1997899A1 EP1100936A1 DK1100936T3 DE69939744C0 CN1309714T CN1309714A CN1289680C CA2333432AA AU4910399A1 AU0766672B2 AT0411391E	Method for production of stress tolerant plants	cold stress, drought stress or heat stress (among others)	2008-10-15 / 1999-07-12
	Bayer	**US20090151021A1** WO2007131699A3 WO2007131699A2 EP2018431A2 CN11443451A CA2651734AA AU7251879AA	Novel stress-related microRNA molecules	increased tolerance to low or high temperatures, drought, high light intensities, chemical pollution, flooding, high salinity, high light intensities, high UV irradiation	2009-06-11 / 2007-05-10
	Bayer Crop Science	**WO2009132779A1** EP2113172A1	Method for improved utilization of the production potential of transgenic plants	abiotic stress tolerance	2009-11-05 / 2009-04-17
	Bayer Crop Science	**EP2039772A2**	Method for improved utilization of the production potential of transgenic plants	increasing abiotic stress tolerance of plant by use of proprietary chemical Fluopyram (fungicide)	2009-03-25 / 2009-01-06
	Bayer Crop Science	**EP2039770A2**	Method for improved utilization of the production potential of transgenic plants	increasing abiotic stress tolerance of plant by use of chemical composition	2009-03-25 / 2009-01-06
	Bayer Crop Science	**EP2039771A2**	Method for improved utilization of the production potential of transgenic plants	increasing abiotic stress tolerance of plant by use of proprietary chemical Bixafen	2009-03-25 / 2009-01-06
	Bioceres (Argentina)	**US7674955** WO04099365C2 WO04099365A2 US20070180584A1 MX2005PA11774A MX5011774A CN11405391A BRI0318314A BR0318314A AU3237161AA	Transcription factor gene induced by water deficit conditions and abscisic acid from Helianthus annuus, promoter and transgenic plants	Drought tolerance	2010-03-09 / 2003-05-02
	Carmel-Haifa University Economic	**EP1789545B1**	Stress tolerant	osmotic, heat,	2008-09-03

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
	Corp. Ltd. (Israel)	WO06027779A1 US20080263729A1 EP1789545A1 DE602005009553C0	organisms expressing a map kinase homologue	freeze, dehydration, oxidative or high salinity stress	/ 2005-09-08
	Centre National De La Recherche Scientific (France)	**EP1487270B1** ZA0407486A WO03079785A1 US20090018020A1 US20050153933A1 PT1487270E JP2005527532T2 FR2837668B1 FR2837668A1 ES2333313T3 EP1487270B1 EP1487270A1 DE60329906C0 CA2480017AA AU3232302AA AT0447325E	Use of a polysaccharide for increasing the resistance to abiotic stress in plants	abiotic stress, such as adaptation to the cold, or to a hydric stress such as drought, humidity or salinity	2009-11-04 / 2003-03-27
	Ceres, Inc.	**US20090094717A1**	Nucleotide sequences and corresponding polypeptides conferring modulated plant characteristics	abiotic stress tolerance – among many others	2009-04-09 / 2008-10-03
	Chromatin Inc. (USA)	**US20090222947A1** ZA0802962A WO2007030510A3 WO2007030510A2 NO0151229C NO0151229B KR8400391B1 JP55156686A2 EP1929019A2 AU6287553AA	Plants Modified With Mini-Chromosomes	resistance to drought, heat, chilling, freezing, excessive moisture, or salt stress	2009-09-03 / 2006-09-07
	Crop Design N.V. (Belgium) (owned by BASF) Crop Functional Genomics Center (Republic of Korea)	**WO2009016104A1** KR10034027A EP2176285A1 CA2694053AA AU8281821AA AR0067672A1	Plants having enhanced yield-related traits	yield-related traits obtained under drought stress	2009-02-05 / 2008-07-25
	CropDesign N.V. Owned by BASF	**EP1697527B1** ZA0605118A WO05061702A3 WO05061702A2 US20080229445A1 RU6126525A RU2377306C2 JP2007515167T2 EP1697527A2 CN1906304A CA2550233AA BRI0418000A BR0418000A AU4303529AA	Plants having increased yield and method for making the same	abiotic stress conditions	2010-05-19 / 2004-12-22
	CropDesign N.V. Owned by BASF	**EP2166086A2** ZA0805634A WO2007064724A3 WO2007064724A2 US20090070894A1 RU8126445A EP2177618A2 EP2166106A2 EP2157172A3 EP2157172A2 EP1954805A2	Plants having improved growth characteristics and methods for making the same	abiotic stress resistance	010-03-24 / 2006-11-29

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		EP1803818A1 CN11365786A CA2631779AA AU6320596AA AR0058268A1			
	CropDesign N.V. (owned by BASF)	**US20090241218A1** WO2007138070A3 WO2007138070A2 MX2008015093 EP2035562A2 CN11495640A CA2652446AA AR0061787A1	Plants having enhanced yield-related traits	abiotic stress resistance	2009-09-24 / 2007-05-30
	CropDesign N.V. (owned by BASF)	**US20090222952A1** ZA0804847A WO2007054522A1 EP1948682A1 CN11356188A CA2629953AA AU6311005AA AR0056790A1	Plants Having Improved Growth Characteristics	increased resistance to abiotic stress or increased resistance to UV radiation	2009-09-03 / 2006-11-08
	CropDesign N.V. (Belgium) Owned by BASF	**EP2189534A2**	Plants transformed with SYT-polypeptide having increased yield under abiotic stress	salt stress; drought stress; reduced nutrient availability	2010-05-26 / 2007-08-02
	CropDesign N.V. (Belgium) Owned by BASF	**EP2172556A2** WO2008142163A3 WO2008142163A2 MX9012451A KR10035688A EP2069508A2 CN11688214A CA2685848AA AR0066714A1	Plants having enhanced yield-related traits	drought	2010-04-07 / 2008-05-23
	CropDesign, NV (Belgium) Owned by BASF	**US20100146661A1** WO02052012C1 WO02052012A3 WO02052012A2 US20080057582A1 US20040111769A1 US7427697 US7227053 JP2004524015T2 EP1343875A2 CA2432380AA AU2237249BB	Sugar beet genes involved in stress tolerance	salt, drought, cold or frost	2010-06-10 / 2008-08-15
	Donald Danforth Plant Science Center (USA) University Of Missouri (USA)	**WO2009120950A2** WO2009120950A3 US20100037351A1	Alteration of phospholipase de or phospholipase da3 expression in plants	drought, high salinity, low temperature	2009-10-01 / 2009-03-27
	Dow Agrosciences (Agrigenetics)	**US7432416** WO03081988A3 WO03081988A2 US20090144850A1 US20050257294A1 CA2498668AA AU3224789BB AU3224789AA	Generation of plants with improved drought tolerance	drought tolerance	2008-10-07 / 2003-03-27
	Dow Agrosciences	**US20090300980A1**	Transgenic corn w/ insect protection traits in combination w/ drought tolerance and/or reduced inputs	drought tolerance	2009-12-10 / 2009-05-01
	Dow Agrosciences (Rohm and Haas)	**WO2009039001A1** US20090077684A1	Modification of physiological	control of ethylene sensitive functions of	2009-03-26 / 2008-09-

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		KR10068435A EP2183355A4 EP2183355A1 ECSP100041A CA2698460AA AU8302504AA AR0068468A1	responses in plants	transgenic plants including ripening, flower senescence drought, heat, etc.	09
	DuPont (Pioneer Hi-bred)	**US20090276920A1** WO06074437C1 WO06074437A2 US20080235821A1 US20060191040A1 US7588939 US7314758 EP1846561A1 CA2592704AA	Nucleotide sequences encoding ramosa3 and sister of ramosa3	increased drought tolerance	2009-11-05 / 2009-07-07
	Dupont (Pioneer Hi-bred)	**US7737342**	Maize variety 35K02	Abiotic stress	2010-06-15 / 2008-04-15
	Dupont (Pioneer Hi-bred)	**US7737341**	Maize variety PHRJB	Abiotic stress	2010-06-15 / 2008-04-15
	Dupont (Pioneer Hi-bred)	**US7737340** WO2010042419A1	Maize variety PHGWD	Abiotic stress	2010-06-15 / 2008-04-15
	Dupont (Pioneer Hi-bred)	**US7737336**	Inbred maize line PHD62	Abiotic stress	2010-06-15 / 2007-10-31
	Dupont (Pioneer Hi-bred)	**US7732683**	Maize variety	Abiotic stress	010-06-08 / 2008-04-15
	Dupont (Pioneer Hi-bred)	**US7728207**	Maize variety X6P908	abiotic stress	2010-06-01 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7718856**	Inbred maize line PHE2E	abiotic stress tolerance	2010-05-18 / 2007-10-31
	DuPont (Pioneer Hi-Bred)	**WO2010053621A2**	Plants having altered agronomic characteristics under nitrogen limiting conditions	tolerance to nitrogen limiting conditions	2010-05-14 / 2009-09-09
	DuPont (Pioneer Hi-Bred)	**US7714205**	Inbred maize line PHH54	abiotic stress tolerance	2010-05-11 / 2007-10-31
	DuPont (Pioneer Hi-Bred)	**US7705219** WO2010040670A2	Maize variety X6R223	Abiotic stress tolerance	2010-04-27 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7705218**	Inbred maize line PHB4D	Abiotic stress tolerance	2010-04-27 / 2007-10-30
	DuPont (Pioneer Hi-Bred)	**US7700856** US6897360 US20070107094A1	Maize variety X6K236	Abiotic stress tolerance	2010-04-20 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7700855**	Maize variety X6N727	Abiotic stress tolerance	2010-04-20 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7700854**	Maize variety 39B22	Stress tolerance	010-04-20 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7687687**	Inbred maize line PH93G	abiotic stress tolerance	2010-03-30 / 2007-10-31
	DuPont (Pioneer Hi-Bred)	**US7683240**	Inbred maize line PH8ER	Stress tolerance	2010-03-23 / 2007-10-31
	DuPont (Pioneer Hi-Bred)	**US7667107** US20070107102A1	Maize hybrid variety 34M78	Abiotic stress tolerance	2010-02-23 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7663031** WO2010042507A1	Maize variety PHW2M	Abiotic stress tolerance	2010-02-16 / 2008-04-

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
					15
	DuPont (Pioneer Hi-Bred)	**US7663029** WO2009143193A3 WO2009143193A2	Soybean variety RJS38001	Abiotic stress tolerance	2010-02-16 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7655843** WO2010028315A1 WO2010028311A1 WO2010028307A1 WO2010028278A3 WO2010028278A2 WO2010011796A3 WO2010011796A2 WO2009146132A3 WO2009146132A2 WO2009108858A3 WO2009108858A2	Maize variety PHRAT	abiotic stress tolerance	2010-02-02 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7655842**	Maize variety PHPT2	abiotic stress tolerance	2010-02-02 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7652201**	Soybean variety RJS48001	abiotic stress tolerance	2010-01-26 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7652200**	Soybean variety XB35J08	abiotic stress tolerance	2010-01-26 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7652195** US20060294624A1	Alfalfa variety 53V52	abiotic stress tolerance	2010-01-26 / 2006-09-20
	DuPont (Pioneer Hi-Bred)	**US20100017908A1**	Highly Transformable Elite Doubled Haploid Line PH17AW	abiotic stress tolerance	2010-01-21 / 2008-07-17
	DuPont (Pioneer Hi-Bred)	**US7645923**	Soybean variety RJS32001	abiotic stress tolerance	2010-01-12 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7645922**	Soybean variety RJS28002	abiotic stress tolerance	2010-01-12 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7645921** WO2009143085A1	Soybean variety XB15A08	abiotic stress tolerance	2010-01-12 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7642421** WO2009142744A2 WO2009142744A3	Soybean variety XB53S08	abiotic stress tolerance	010-01-05 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7642420** WO2009143210A1 US20080178350A1	Soybean variety 92M22	abiotic stress tolerance	2010-01-05 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7642419**	Soybean variety RJS30001	abiotic stress tolerance	2010-01-05 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7642418**	Soybean variety XB26L08	abiotic stress tolerance	2010-01-05 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7642417** WO2009143120A9 WO2009143120A3 WO2009143120A2	Soybean variety XB39A08	abiotic stress tolerance	2010-01-05 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7638688** US20070107091A1	Maize hybrid variety X5M895	abiotic stress tolerance	2009-12-29 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**WO2009152224A1** US20090307800A1	Compositions and methods of use of mitogen-activated protein kinase	abiotic stress resistance	2009-12-17 / 2009-06-10
	DuPont (Pioneer Hi-Bred)	**US7632993**	Maize variety PHNWK	abiotic stress tolerance	2009-12-15 / 2008-04-15

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
	DuPont (Pioneer Hi-Bred)	**US7632992**	Inbred maize line PHE6W	abiotic stress tolerance	2009-12-15 / 2007-10-31
	DuPont (Pioneer Hi-Bred)	**US7629514**	Inbred maize line PHDWD	abiotic stress tolerance	2009-12-08 / 2007-10-31
	DuPont (Pioneer Hi-Bred)	**US7629513**	Inbred maize line PHHCC	abiotic stress tolerance	2009-12-08 / 2007-10-31
	DuPont (Pioneer Hi-Bred)	**US7629512**	Inbred maize line PHE6Z	abiotic stress tolerance	2009-12-08 / 2007-10-30
	DuPont (Pioneer Hi-Bred)	**US7629511**	Inbred maize line PHF4R	abiotic stress tolerance	2009-12-08 / 2007-10-29
	DuPont (Pioneer Hi-Bred)	**US20090300789A1** US20080072344A1	Highly Transformable Elite Inbred Line-PHWWE	abiotic stress tolerance	2009-12-03 / 2009-08-03
	DuPont (Pioneer Hi-Bred)	**US20090293141A1** US20080072343A1	Highly Transformable Elite Doubled Haploid Line-PHWWD	abiotic stress tolerance	2009-11-26 / 2009-08-03
	DuPont (Pioneer Hi-Bred)	**US7622647** EP2124502A1 EP2124499A1	Soybean variety RJS31004	abiotic stress tolerance	2009-11-24 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US20090288217A1** US20080299658A1	Highly Transformable Elite Doubled Haploid Line PHWVZ	abiotic stress tolerance	2009-11-19 / 2009-07-27
	DuPont (Pioneer Hi-Bred)	**US7619149** WO2009086385A3 WO2009086385A2	Maize variety PHWSF	abiotic stress tolerance	2009-11-17 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7619148**	Soybean variety XB22Y08	abiotic stress tolerance	2009-11-17 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7615690**	Inbred maize variety PHHCF	abiotic stress tolerance	2009-11-10 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7612265** US5844116 US6686520 US6723903 US7176363	Maize variety PHJ8C	abiotic stress tolerance	2009-11-03 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7612264** WO2010041241A2	Maize variety PHGDD	abiotic stress tolerance	2009-11-03 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7612263** WO2009101597A3 WO2009101597A2	Maize variety PHRAN	abiotic stress tolerance	2009-11-03 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7612262**	Inbred maize variety PHEKN	abiotic stress tolerance	2009-11-03 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**WO2009132057A1**	Drought tolerant plants and related constructs and methods involving genes encoding protein tyrosine phosphatases	increasing drought tolerance	2009-10-29 / 2009-04-22
	DuPont (Pioneer Hi-Bred)	**US7605307**	Soybean variety XB28N08	abiotic stress tolerance	2009-10-20 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**WO2009126359A1**	Plants having altered agronomic characteristics under nitrogen	increased nitrogen stress tolerance and others	2009-10-15 / 2009-01-30

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
			limiting conditions and related constructs		
	DuPont (Pioneer Hi-Bred)	**US7601898**	Soybean variety XB27N08	abiotic stress tolerance	2009-10-13 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**WO2009124282A1** US20080244765A1	Methods and compositions for pollination disruption	abiotic stress tolerance	2009-10-08 / 2009-04-03
	DuPont (Pioneer Hi-Bred)	**US7598438**	Inbred maize variety PHEVC	abiotic stress tolerance	2009-10-06 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7598437** US20070107096A1	Maize hybrid variety X5K673	abiotic stress tolerance	2009-10-06 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7598435**	Soybean variety XB33U08	abiotic stress tolerance	2009-10-06 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7595436**	Inbred maize variety PHE3D	abiotic stress tolerance	2009-09-29 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7592524**	Maize variety X6H867	abiotic stress tolerance	2009-09-22 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7592519** WO2009145935A1	Soybean variety XB27D08	abiotic stress tolerance	2009-09-22 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7589264** WO2010041236A1	Maize variety 36V52	abiotic stress tolerance	2009-09-15 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7589263**	Inbred maize variety PHD0G	abiotic stress tolerance	2009-09-15 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7589261**	Soybean variety XB41M08	abiotic stress tolerance	2009-09-15 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7589260** WO2009143156A3 WO2009143156A2	Soybean variety XB05J08	abiotic stress tolerance	2009-09-15 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7589259** WO2009141332A1	Soybean variety XB33T08	abiotic stress tolerance	
	DuPont (Pioneer Hi-Bred)	**US7586028**	Maize variety PHR1R	abiotic stress tolerance	2009-09-08 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7586027** WO2010041968A2	Maize variety PHHMD	abiotic stress tolerance	2009-09-08 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7586026**	Inbred maize variety PHHNJ	abiotic stress tolerance	2009-09-08 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7586025** WO2009143048A3 WO2009143048A2	Soybean variety XB30Y08	abiotic stress tolerance	2009-09-08 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US20080242545A1** ZA0503562A WO04043145A3 WO04043145A2 US20040139506A1 US7265219 EP1570064A4 EP1570064A2 CA2504947AA BR0316076A AU3286916BB AU3286916AA	Auxin-Repressed, Dormancy-Associated Promoter and Uses Thereof	abiotic stress	2008-10-02 / 2007-07-24

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
	DuPont (Pioneer Hi-Bred)	**US7582816**	Maize variety PHW5F	abiotic stress tolerance	2009-09-01 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7582815**	Inbred maize variety PHHHN	abiotic stress tolerance	2009-09-01 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7582814**	Inbred maize variety PHENA	abiotic stress tolerance	2009-09-01 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7582813**	Soybean variety XB40U08	abiotic stress tolerance	2009-09-01 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7582812** US20080168581A1	Soybean variety 90Y40	abiotic stress tolerance	2009-09-01 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7582811** WO2009036400A9 WO2009036400A2	Soybean variety XB29M08	abiotic stress tolerance	2009-09-01 / 2008-03-25
	DuPont (Pioneer Hi-Bred)	**US7579530**	Inbred maize line PHHCA	abiotic stress tolerance	2009-08-25 / 2007-10-30
	DuPont (Pioneer Hi-Bred)	**US7579529** WO05075655A3 WO05075655A2 US20090328252A1 US20050257289A1 EP1711614B1 EP1711614A2 DE602005012233C0 CA2554644AA AU5210493BB AU5210493AA AT0420188E	AP2 domain transcription factor ODP2 (ovule development protein 2)	modulating stress tolerance	2009-08-25 / 2005-01-28
	DuPont (Pioneer Hi-Bred)	**US7576271**	Maize variety PHF3D	abiotic stress tolerance	2009-08-18 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7576270** WO2010042557A2	Maize variety PHF5H	abiotic stress tolerance	2009-08-18 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7576269** WO2010042163A2	Maize variety PHGNF	abiotic stress tolerance	2009-08-18 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7576268**	Inbred maize line PHENN	abiotic stress tolerance	2009-08-18 / 2007-10-30
	DuPont (Pioneer Hi-Bred)	**US7576267**	Inbred maize line PHCKR	abiotic stress tolerance	2009-08-18 / 2007-10-30
	DuPont (Pioneer Hi-Bred)	**US7572963**	Maize variety PHNWJ	abiotic stress tolerance	2009-08-11 / 2008-04-15
	DuPont (Pioneer Hi-Bred)	**US7572962** US20070107098A1	Maize hybrid variety X5H332	abiotic stress tolerance	2009-08-11 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7572961** US20070107088A1	Maize hybrid variety 32N89	abiotic stress tolerance	2009-08-11 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7569755**	Inbred variety PH238	abiotic stress tolerance	2009-08-04 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7569754**	Inbred maize variety PH4RF	abiotic stress tolerance	2009-08-04 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7569753**	Inbred maize variety PHE4N	abiotic stress tolerance	2009-08-04 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**WO2009094527A2** WO2009094527A3 US20090188003A1	Transcriptional activators involved in abiotic stress	abiotic stress, e.g. temperature extremes	2009-07-30 / 2009-01-23

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
			tolerance		
	DuPont (Pioneer Hi-Bred)	**US7563962**	Inbred maize variety PHEMP	abiotic stress tolerance	2009-07-21 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7563961**	Inbred maize variety PHE70	abiotic stress tolerance	2009-07-21 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7563960**	Inbred maize variety PHP0A	abiotic stress tolerance	2009-07-21 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7563959** US20070107101A	Hybrid maize plant and seed X5P505	abiotic stress tolerance	2009-07-21 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7563958** US20070107100A1	Maize hybrid variety 33F12	abiotic stress tolerance	2009-07-21 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7547831**	Inbred maize line PHGJB	abiotic stress tolerance	2009-06-16 / 2007-10-30
	DuPont (Pioneer Hi-Bred)	**US7547830**	Inbred maize line PH4RD	abiotic stress tolerance	2009-06-16 / 2007-10-30
	DuPont (Pioneer Hi-Bred)	**US7547829**	Inbred maize line PHBBK	abiotic stress tolerance	2009-06-16 / 2007-10-30
	DuPont (Pioneer Hi-Bred)	**WO2009061776A1** US20090119804A1 CA2703243AA AR0069240A1	Plants having altered agronomic characteristics under nitrogen limiting conditions and related constructs and methods	drought tolerance, nitrogen uptake	2009-05-14 / 2008-11-05
	DuPont (Pioneer Hi-Bred)	**US7528308**	Inbred maize variety PHH9H	abiotic stress tolerance	2009-05-05 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7528307**	Inbred maize variety PHH5G	abiotic stress tolerance	2009-05-05 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**WO2009052476A2** WO2009052476A3 US20090260111A1 US20090106857A1 CA2702592AA	Maize stress-responsive nac transcription factors and promoter	drought tolerance	2009-04-23 / 2008-10-20
	DuPont (Pioneer Hi-Bred)	**US7521610** US20070107099A1	Maize hybrid variety X5T123	abiotic stress tolerance	2009-04-21 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7504568** US20070107089A1	Maize hybrid variety X5F802	abiotic stress tolerance	2009-03-17 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**WO2009029739A2** WO2009029739A3 US20090064373A1 EP2180780A2 CA2695646AA	Plants with altered root architecture, related constructs and methods involving genes encoding nucleoside diphosphatase kinase (ndk)	drought tolerance among others	2009-03-05 / 2008-08-29
	DuPont (Pioneer Hi-Bred)	**US7473827** US20070107095A1	Maize hybrid variety X5K655	abiotic stress tolerance	2009-01-06 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US7439425**	Inbred maize variety PHEWB	abiotic stress tolerance	2008-10-21 / 2007-01-31
	DuPont (Pioneer Hi-Bred)	**US20080189810A1** WO06081060A2	Compositions and methods of use of	seed set during abiotic stress	2008-08-07 / 2008-01-

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		US20060168692A1	response regulators		28
	DuPont (Pioneer Hi-Bred)	**US20080178325A1** WO2008083198C1 WO2008083198A8 WO2008083198A3 WO2008083198A2 EP2102364A2 EA0970647A1 CA2674243AA	Genetic markers for Orobanche resistance in sunflower	abiotic stress tolerance	2008-07-24 / 2007-12-27
	DuPont (Pioneer Hi-Bred)	**US7399914** US20070107097A1	Maize hybrid variety X5H310	abiotic stress tolerance	2008-07-15 / 2007-01-31
	Evogene Ltd.	**US20090260109A1** ZA0509383A WO2007020638A3 WO2007020638A2 WO04104162A3 WO04104162A2 US20090089898A1 US20060123516A1 US7554007 RU5140106A RU2350653C2 MX2005PA12565A MX2008002262 MX5012565A EP1945021A4 EP1945021A2 EP1625199A4 EP1625199A2 CN11437947A CN10591770C CN1823168A CA2619114AA CA2526440AA BRI0411182A BR0411182A AU6281018AA AU5234725AA	Methods of increasing abiotic stress tolerance and/or biomass in plants generated thereby	abiotic stress tolerance	2009-10-15 / 2009-06-03
	Evogene Ltd.	**WO2009083958A2** WO2009083958A8 WO2009083958A3 AR0069985A1 WO2009083958C1	Isolated polypeptides, polynucleotides useful for modifying water user efficiency, fertilizer use efficiency, biotic/abiotic stress tolerance, yield and biomass	water use efficiency, fertilizer use efficiency, biomass, vigor, and/or yield of a plant	2009-07-09 / 2008-12-23
	Evogene Ltd. (Israel)	**WO2010049897**	Isolated polynucleotides and polypeptides and methods of using same	abiotic stress tolerance	2010-05-06 / 2009-10-28
	Evogene, Ltd.	**WO2009013750A3** WO2009013750A2 EP2183371A2 CA2694481AA AU8278654AA	Polynucleotides polypeptides encoded thereby, and methods of using same for increasing abiotic stress tolerance	abiotic stress	2010-03-04 / 2008-07-24
	Evogene, Ltd.	**WO2010020941**	Isolated polypeptides and polynucleotides useful for increasing nitrogen use efficiency, abiotic stress	Abiotic stress tolerance	2010-02-25 / 2009-08-18

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
			tolerance		
	Evogene, Ltd.	**WO2009141824A2** WO2009141824A3	Isolated polypeptides, polynucleotides	abiotic stress tolerance	2009-11-26 / 2009-05-21
	Evogene, Ltd.	**US20090293154A1** ZA0803989A WO2007049275A3 WO2007049275A2 RU8120395A JP56015193A2 IL0190918A0 EP1940217A4 EP1940217A2 EP0022457B1 CN11505587A CA1155911A1 AU6307457AB AU6307457AA	Isolated Polypeptides, Polynucleotides	tolerance to a stress condition	2009-11-26 / 2006-10-24
	Evogene, Ltd.	**US20090293146** WO2008075364C1 WO2008075364A8 WO2008075364A3 WO2008075364A2 MX2009006660 EP2096909A2 CA2672756AA AU7335706AB AU7335706AA	Polynucleotides and polypeptides involved in plant fiber development	abiotic stress tolerance	2009-11-26 / 2007-12-20
	Expressive Research B.V. (Netherlands)	**US20100146664A1** WO2008150165A1 EP2171067A1 EP2000539A1 CA2690855AA AU8260738AA AR0066883A1	Resistance to abiotic stress	Abiotic stress; high salinity; osmotic stress; frost damage	2010-06-10 / 2009-12-03
	Grasslanz Technology Limited (New Zealand)	**US7585660** WO04029227A1 US20090181447A1 US20060121593A1 PT1560914E NZ0521653A MX5003262A ES2322141T3 EP1560914B1 EP1560914A4 EP1560914A1 DK1560914T3 DE60326162C0 CA2500144AA AU3267883BB AU3267883AA AT0422535E	Grass endophytes	abiotic stresses including water deficit	2009-09-08 / 2003-09-26
	iDiverse, Inc.	**US20080184384A1**	QM protein-mediated stress tolerance in transformed eukaryotes	abiotic stress	2008-07-31 / 2007-02-10
	Improcrop U.S.A., Inc.	**US20100144525A1**	Resistance to abiotic stress in plants	Abiotic stress, including excessive salinity	2010-06-10 / 2006-03-31
	Institute National Polytechnique de Toulouse (France)	**EP2163639A1** WO2010026219A3 WO2010026219A2	New tomato ethylene response factors and uses thereof	abiotic stress	2010-03-17 / 2008-09-04
	Institute of Genetics and Developmental Biology, Chinese Academy of Sciences (China)	**WO2009060418A2** WO2009060418A3 CN11182353A AR0069253A1	Transgenic plants and modulators for improved stress tolerance	including drought-resistant and/or salt-resistant rice plants	2009-05-14 / 2008-11-07
	Institute of Genetics and Developmental Biology, Chinese	**WO2009057061A1** CN11173002A	Transgenic plants and modulators for	drought-tolerant and/or salt-tolerant	2009-05-07 / 2008-10-

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
	Academy of Sciences (China)	AR0069115A1	improved stress tolerance	plant	29
	J.R. Simplot Company (USA)	**US7598430** WO03079765A3 WO03079765A2 US20050034188A1 US20040003434A1 NZ0536037A EP1560484A4 EP1560484A2 CA2479739AA AU3230693AA	Refined plant transformation	including increased drought tolerance, enhanced cold and frost tolerance, enhanced salt tolerance	2009-10-06 / 2003-03-20
	Keygene N. V. (Netherlands)	**US20090328248A1** ZA0805468A WO2007069894A3 WO2007069894A2 RU8129105A KR8083145A JP2009526518T2 EP1960528A2 CN11370939A CA2633145AA AU6325585AA	Constitutive plant promoters	abiotic stress conditions	2009-12-31 / 2006-12-12
	Keygene N.V. Netherlands	**WO2009082208A2** WO2009082208A3	Trichome specific promoters	abiotic stresses	2009-07-02 / 2008-12-16
	M.S. Swaminathan Research Foundation	**US20090313726A1** WO2007029270A3 WO2007029270A2 EP1934351A2 CA2648516AA AU6288668AA	Abiotic stress tolerant gene from avicennia marina encoding a protein	abiotic stress, such as salt, drought or dehydration	2009-12-17 / 2006-09-07
	M.S. Swaminathan Research Foundation (India)	**EP1945769B1** WO2007029271A2 US20090055972A1 US7655837 EP1945769A2 DE602006012349C0 CA2638831AA AU6288669AA AT0458055E	Glutathione-s-transferase gene from prosopis juliflora confers abiotic stress tolerance in plants	Abiotic stress tolerant transgenic plants, such as rice, maize, wheat, barley or sorghum	2010-02-17 / 2006-09-07
	Maharashtra Hybrid Seeds Company Ltd. (India)	**US20090025099A1** WO06018857A2 TR0701282T1 MX2007002083	Methods for plant regeneration, transformation and production of insect resistant transgenic okra	drought resistance, abiotic stress resistance	2009-01-22 / 2005-08-16
	Max-Planck-Gesellschaft Zur Foerderung Der Wissenschaften E.V. Universität Potsdam (Germany)	**WO2009127443A2** WO2009127443A3	Transcription factors involved in salt stress in plants	salt stress and/or osmotic stress	2009-10-22 / 2009-04-17
	Mendel Biotechnology, Inc. (USA)	**US20100162427A1**	Polynucleotides and polypeptides in plants	increased drought and freezing tolerance, among others	2010-06-24 / 2010-02-08
	Mendel Biotechnology	**US20080301836A1**	Selection of transcription factor variants	abiotic stress tolerance	2008-12-04 / 2008-05-19
	Mendel Biotechnology	**US20080229448A1** WO06069201A2 US20070226839A1 EP1836307A2 CA2591936AA BRPI0519538A	Plant Stress Tolerance from Modified Ap2 Transcription Factors	abiotic stress tolerance	2008-09-18 / 2005-12-20
	Mendel Biotechnology, Inc. (USA) [224 family members]	**US7663025** ZA0506418A WO9938977A3 WO9938977A2 WO9809521A1 WO05047516A3	Plant transcriptional regulators	improved tolerance to drought, shade, and low nitrogen conditions	2010-02-16 / 2006-05-15

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		WO05047516A2 WO05038034A3 WO05038034A2 WO04108900A3 WO04108900A2 WO04076638A3 WO04076638A2 WO04031349A3 WO04031349A2 WO03014327A3 WO03014327A2 WO03013228A3 WO03013228A2 WO03013227C2 WO03013227A3 WO03013227A2 WO02079403C2 WO02079403A3 WO02079403A2 WO02074917A3 WO02074917A2 WO0217430A1 WO0215675C1 WO0215675A1 WO0136598A1 WO0136597A1 WO0136444A1 WO0135727A1 WO0135726A1 WO0135725A1 WO0126459A3 WO0126459A2 US20100107279A1 US20100083402A1 US20100083395A1 US20090276912A1 US20090265807A1 US20090192305A1 US20090138981A1 US20090049566A1 US20080313756A1 US20080301841A1 US20080301840A1 US20080163397A1 US20080155706A1 US20080010703A1 US20070240243A9 US20070226839A1 US20070209086A1 US20070199107A1 US20070186308A1 US20070101454A1 US20070061911A9 US20070033671A1 US20070022495A1 US20060272060A1 US20060242738A1 US20060195944A1 US20060162018A1 US20060162006A9 US20060015972A1 US20050172364A1 US20050160493A9 US20050155117A1 US20050120408A9 US20050097638A1 US20050086718A1 US20050076412A1 US20040128712A1 US20040098764A1			

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		US20040045049A1 US20040019927A1 US20040019925A1 US20030233680A1 US20030229915A1 US20030226173A1 US20030217383A1 US20030188330A1 US20030167537A1 US20030131386A1 US20030121070A1 US20030101481A1 US20030093837A1 US20030061637A1 US20030046723A1 US20020157136A1 US20020142281A1 US7692067 US7659446 US7601893 US7598429 US7511190 US7345217 US7238860 US7223904 US7196245 US7193129 US7135616 US6946586 US6835540 US6717034 US6664446 US6417428 US5965705 US5892009 US5891859 MX2002PA04884A MX2002PA04882A MX2002PA04881A MX2002PA04880A MX2002PA04878A MX2002PA04870A MX3008922A MX2004884A MX2004882A MX2004881A MX2004880A MX2004878A MX2004870A MX2003669A JP2004500044T2 ES2307542T3 EP2133360A3 EP2133360A2 EP1950306A1 EP1682668A2 EP1673462A2 EP1659180A3 EP1659180A2 EP1635629A4 EP1635629A2 EP1601758A4 EP1601758A2 EP1566444A3 EP1566444A2 EP1546336A4 EP1546336A2 EP1485490A4 EP1485490A2 EP1420630A4			

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		EP1420630A2 EP1406483A4 EP1406483A1 EP1381268A4 EP1381268A2 EP1312132A1 EP1231835A4 EP1231835A2 EP1230345B1 EP1230345A4 EP1230345A1 EP1230344A4 EP1230344A1 EP1230256A4 EP1230256A1 EP1229782A4 EP1229782A1 EP1229781A4 EP1229781A1 EP1229780A4 EP1229780A1 EP1053328A2 EP0955807A4 EP0955807A1 DK1230345T3 CA2516645AA CA2456979AA CA2456972AA CA2442496AA CA2391569AA CA2391446AA CA2391443AA CA2390600AA CA2390597AA CA2390594AA CA2386170AA CA2319714AA BRI0416473A BRI0415345A BRI0410992A BRI0407822A BR9908523A BR0416473A BR0415345A BR0410992A BR0407822A BR0314389A BR0208573A BR0015635A BR0015634A BR0015633A BR0015632A BR0015631A BR0015628A BR0014750A AU4290050AA AU4214935AA AU4157797A1 AU4000063BB AU3285856AH AU3285856AA AU2324783AA AU2323142AA AU2313749AA AU2309510AA AU2250342AA AU0780463B2 AU0764134B2 AU0722208B2 AU0186617A5			

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		AU0183439A5 AU0119199A5 AU0117683A5 AU0117682A5 AU0117671A5 AU0117656A5 AU0116101A5 AU0115698A5			
	Metanomics GmbH	**US20100050296A1** WO06013010A3 WO06013010A2 EP1774004A2 CN11001956A CA2575127AA BRI0514003A AU5268943AA	Preparation of organisms with faster growth and/or higher yield	abiotic stress tolerance	2010-02-25 / 2005-07-21
	Monsanto (76 family members)	**US7723568** ZA0803946A ZA0803234A WO2007047016A3 WO2007047016A2 WO2007011479A3 WO2007011479A2 WO06073727A3 WO06073727A2 US20090235388A1 US20080229456A1 US20070300329A1 US20070118918A1 US20070118917A1 US20070113302A1 US20070113301A1 US20070094748A1 US20070089196A1 US20070089195A1 US20070089194A1 US20070089193A1 US20070089192A1 US20070089191A1 US20070118918A1 US20070118917A1 US20070113302A1 US20070113301A1 US20070094748A1 US20070089196A1 US20070089195A1 US20070089194A1 US20070089193A1 US20070089192A1 US20070089191A1 US20070089190A1 US20070089189A1 US20070089188A1 US20070089187A1 US20070089186A1 US20070089185A1 US20070089184A1 US20070083952A1 US20070083951A1 US20070083950A1 US20070083949A1 US20070083947A1 US20070011775A1 US20060200878A1 US20060064772A1 US7683237 US4383040 PH0015644A JP59045609B4 JP56018595A2	Engineered miRNA precursors for suppressing target gene expression in plants	abiotic stress tolerance	2010-05-25 / 2006-10-10

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		JP56017942A2 GB2059988B EP1941034A4 EP1941034A2 EP1934354A4 EP1934354A2 EP1824967A4 EP1824967A2 EP0022613B1 EA0801074A1 CN11466837A CA2627081AA CA2625031AA CA1157654A1 AU6302969AA AU5323166AB AU5323166AA AU0531148B2 AU0530122B2 AT0005600E AR0055446A1 AR0054169A1			
	Monsanto	**US7659448** US20050235382A1	Plant regulatory sequences for selective control of gene expression	enhanced abiotic stress tolerance	2010-02-09 / 2004-04-19
	Monsanto	**US7674952** US20080091000A1 US20080051570A1 US20080047040A1 US20080047039A1 US20080047038A1 US20050155114A1 US20040123347A1	Stress-inducible plant promoters	enhanced environmental stress tolerance	2010-03-09 / 2007-05-14
	Monsanto	**WO2009129162A2** WO2009129162A3	Methods and compositions for increasing plant disease resistance and yield	resistance to abiotic stresses	2009-10-22 / 2009-04-13
	Monsanto	**WO2009111263A1** WO2009111263C2 WO2009111263A9 WO2009111263A1 PE0901558A1 AR0070495A1	Corn plant event mon87460 and compositions and methods for detection	water deficit tolerant maize plants	2009-09-11 / 2009-02-26
	Monsanto	**US20090151020A1** WO2009073844A1 AR0069573A1	Chimeric and proline rich protein promoters for expression in plants	increased tolerance to drought, increased nitrogen utilization efficiency, increased photosynthetic capacity, increased heat tolerance, and increased cold tolerance	2009-06-11 / 2008-12-05
	Monsanto	**WO2009049110A1** US20090100544A1 CA2702077AA AR0070657A1	Drought tolerant corn with reduced mycotoxin	drought tolerance	2009-04-16 / 2008-10-10
	Monsanto	**WO2009048847A1** WO2009048847C1 WO2009048847A8 US20090100537A1 CA2701229AA AU8311052AA AR0070658A1	Methods and compositions for high yielding soybeans with nematode resistance	drought and/or environmental stress tolerance, among others	2009-04-16 / 2008-10-07
	Monsanto	**WO2008150892A2** WO2008150892A3 EP2154947A2 CN11677517A	Compositions for production of soybean with elevated oil	drought and/or environmental stress tolerance	2008-12-11 / 2008-05-29

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		AR0066786A1	content		
	Monsanto	**WO2008133643A2** WO2008133643A3 US20090070898A1 EP2074227A4 EP2074227A2 AU7352460AB AU7352460AA	Plant microRNAs	abiotic stress tolerance	2008-11-06 / 2007-10-12
	Monsanto (USA)	**WO2010019838A2** WO2010019838A3	Stress tolerant transgenic crop plants	heat tolerance, salt tolerance, drought tolerance and survival after cold shock	2010-02-18 / 2009-08-14
	National Centre for Plant Genome Research (India)	**US7674957** US20070266459A1	Stress responsive transcription factor involved in plant growth and development and methods thereof	increased tolerance to environmental and abiotic stresses	2010-03-09 / 2006-09-19
	None	US20100100984A1 WO2008100112A1 KR9020491A	Transgenic plants exhibiting increased resistance to biotic and abiotic stresses or accelerated flowering time and methods for producing the same	Abiotic stresses	2010-04-22 / 2008-02-15
	None	**US20100095399A1** WO04090141C1 WO04090141A3 WO04090141A2 US20060200879A1 US7612177 EP1616014A2 CN1771327C CN1771327A BRI0409326A BR0409326A	Protein for use in modifying abiotic stress tolerance in yeast	enhanced environmental stress resistance	2010-04-15 / 2009-10-05
	None	**US20100095398A1**	Protection against environmental toxicity through manipulation of the processing of messenger RNA precursors	Enhancing environmental stress such as mineral salt toxicity, cold or freezing stress	2010-04-15 / 2009-07-09
	None	**US20100031389A1** WO2008059048A1 EP2082049A1 CN11548016A CL32902007A1 CA2664729AA AR0064252A1 MX2009005160	Plants having enhanced yield-related traits and a method for making using consensus sequences from the yabby protein family	abiotic stress conditions	2010-02-04 / 2007-11-16
	None	**US20090276917A1** WO2007077398C2 WO2007077398A3 WO2007077398A2 MX8008765A IL0192612A0 FR2895994B1 FR2895994A1 EP1971689A2 CN11389762A CA2636184AA	Gene Promotors Which Can be Used in Plants	abiotic stresses	2009-11-05 / 2007-01-05

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
	None	**US20090178163A1** US20090137394A1 US20070271636A1 US20070130645A1 US7629455 US7491813	Genome-wide identification and characterization of gene expression regulatory elements in *Zea mays* for use in plants	drought tolerance, low nitrogen tolerance, cold tolerance	2009-07-09 / 2008-12-31
	None	**US20090138990A1** WO04092326A3 WO04092326A2 JP2006522608T2 EP1616015B1 EP1616015A2 DE602004008052C0 CN1784494A CA2522054AA BRI0409358A BR0409358A AU4230645BB AU4230645AA AT0369432E	Methods and compositions to increase plant resistance to stress	Improving plant stress tolerance to cold, drought, osmotic stress, phytohormones, abscisic acid and salinity	2009-05-28 / 2004-04-07
	None	**US20090089899A1** WO2007052376A1 JP2007124925A2 CA2622556AA	Method for Enhancing Drought Stress Tolerance in Plants by Active AREB1	drought tolerance	2009-04-02 / 2006-03-15
	None	**US20090038029A1** WO2008022570A1 CN11541165A	Method to alleviate abiotic stress in plants	abiotic stress	2009-02-05 / 2007-08-17
	None	**US20090019601A1** US20090241217A9 US20090087878A9 US20090044297A1 US20080229439A1 US20080104730A1 US20040216190A1 US20040214272A1 US20040031072A1	Nucleic acid molecules and other molecules associated with plants	drought tolerance	2009-01-15 / 2007-06-28
	None	**US20080216195A1**	Drought and high light tolerant transgenic plants	high light, water-deficit, and drought	2008-09-04 / 2006-08-22
	None	**US20080216196A1** WO03044190A1 US20070094752A1 US20050009187A1 US7368630 JP2003219882A2 JP2003144175A2 EP1803813A3 EP1803813A2 EP1452596A4 EP1452596A1 CN10359012C CN1628170A AU2349547AA	Environmental stress-responsive promoter and a gene encoding environmental stress-responsive transcriptional factor	abiotic environmental stress	2008-09-04 / 2008-03-25
	None	**US20080196126A1** WO05122697A3 WO05122697A2	Transgenic Plants Containing a Dehydrin Gene	drought, cold/freezing, or high salinity stress	2008-08-14 / 2005-06-20
	None	**US20080189805A1** WO2008074025A3 WO2008074025A2 EP2121921A2	Novel genes and RNA molecules that confer stress tolerance	abiotic stress	2008-08-07 / 2007-12-13
	None	**US20080189804A1** WO2008076844A3 WO2008076844A2	Novel genes and RNA molecules that confer stress tolerance	abiotic stress	2008-08-07 / 2007-12-13
	None	**US20080184385A1** WO2008043268A1 CN11548013A	Use of GmRD22-like genes to protect against	salinity stress, drought, and/or dehydration	2008-07-31 / 2007-09-28

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
			abiotic stress		
	None	**WO2010018598A1**	Hybrid-type histidine kinase gene isolated from indica rice IR64	abiotic stress conditions	2010-02-18 / 2009-08-10
	Plant Sensory Systems, LLC (USA)	**US20090077693A1** WO2010060609A1 WO2009032755A4 WO2009032755A3 WO2009032755A2 WO0009032755 EP2195442A2 CA2698125AA AU8296450AA	Methods of producing GABA	increased tolerance to biotic or abiotic stress	2009-03-19 / 2008-08-29
	Reliance Life Sciences Pvt. Ltd. (India)	**WO2010058428A2**	Identification of genes related to abiotic stress tolerance in jatropha curcas	salinity, drought, and ion stresses	2010-05-27 / 2009-11-20
	Riken Corp. (Japan)	**EP1116794B1** US20060212969A1 US20020104120A1 US7482509 US7049487 JP2001258579A2 ES2326789T3 EP1116794A3 EP1116794A2 DE60138972C0 CN1307137A CN1294267C AU54000077BB AU0785477B2 AU0113688A5 AT0434048E	Transgenic plants carrying neoxanthin cleavage enzyme gene	improved stress tolerance	2009-06-17 / 2001-01-11
	Riken Corp. (Japan) Toyota Jidosha Kabushiki Kaisha (Japan)	**EP1209228B1** US20070006348A1 JP2007167074A2 JP2002325583A2 JP04162050B2 JP03995912B2 EP1209228A3 EP1209228A2 DE60135967C0 CN1373222A AU53000084BB AU7201459BB AU7201459AA AU0785384B2 AU0191431A5	Environmental stress responsive promoter	cold stress, drought stress, and salt stress	2008-10-01 / 2001-11-21
	Salk Institute for Biological Studies (USA)	**US20090013433A1**	Compositions, cells, and plants that include BKI1, a negative regulator of BRI1	increased tolerance to abiotic stress	2009-01-08 / 2008-01-09
	Syngenta	**WO2010008760A1** US20100009851A1	Plant regulatory sequences	enhanced drought tolerance	2010-01-21 / 2009-06-19
	Syngenta	**US20100144531A1** WO2008037489A3 WO2008037489A2 JP2010504740T2 EP2076130A2 EP1922928A1 EA0900452A1 CN11534645A CA2664402AA AU7302275AA	Method for enhancing intrinsic productivity of a plant	Stress tolerance; drought, low pH, high soil salinity, heat stress leading to protein degradation, toxic levels of aluminium, etc.	2010-06-10 / 2007-09-28
	Syngenta	**US20100024074A1** WO0198480C1	Arabidopsis derived promoters	abiotic stress resistance	2010-01-28 / 2009-09-

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		WO0198480A3 WO0198480A2 US20100017918A1 US20080120750A1 US7615624 EP1294914A2 CA2413548AA AU0166251A5	for regulation of plant expression		29
	Syngenta (Switzerland)	**US7674893** WO03040322A3 WO03040322A2 US20050010974A1 JP2005514920T2 EP1537136A4 EP1537136A2 CA2462615AA AU2354015BB	Promoters for regulation of gene expression in plant roots	abiotic stress	2010-03-09 / 2002-11-04
	Syngenta/Univ. of Guelph	**WO2010036866A1**	Nitrogen responsive early nodulin gene	increased nitrogen use and stress tolerance	2010-04-01 / 2009-09-25
	Syngenta	**WO2008135296A2** WO2008135296A3 EP2016821A1 EP2002711A1 DE102008028357A1 CA2690561AA AU8248878AA	New hybrid system for brassica napus	abiotic stress resistance	2008-11-13 / 2008-06-13
	Toyo Boseki Kabushiki Kaisha (Japan)	**US20100083401A1** WO0223974A1 US20080010702A1 US20030163851A1 **US7238861** JP2005237387A2 JP03924748B2 EP1329153A4 EP1329153A1 CA2423041AA AU0182570A5	Plants having improved tolerance to various types of environmental stress	including drought stress, oxidation stress, cold stress, osmotic stress, salt stress	2010-04-01 / 2009-09-08
	University of California (USA)	**US20100146669A1**	Wall-associated kinase-like Polypeptide	Nitrogen/nutrient deficiency	2010-06-10 / 2009-11-24
	University of California (USA)	**WO2010060099A2**	Wall-associated kinase-like polypeptide mediates nutritional status perception and response	abiotic stress	2010-05-27 / 2009-11-24
	University of Cape Town (South Africa)	**WO2009060402A2** WO2009060402A3	Plant promoters	abiotic stress-inducible promoter	2009-05-14 / 2008-11-06
	University of Delhi (India)	**US7576263** WO04058963A WO04058963A2 US20060218677A1 JP2006512071T2 EP1578790B8 EP1578790B1 EP1578790A2 CN10343279C CN1771258A AU3288710AH AU3288710AA	Gene OSISAP1 of rice confers tolerance to stresses	increased tolerance to cold stress, drought stress, or salt stress	2009-08-18 / 2003-12-23
	University of Guelph (Canada)	**US20090328255A1** WO2007143819A1 US20090328255A1 MX2008015936 EP2038416A1 CN11501195A	Nitrogen limitation adaptability gene and protein and modulation thereof	abiotic stress tolerance	2009-12-31 / 2007-06-13

	Assignee	Patent/Application No. and patent family members	Title	Targeted Stress	Pub. Date, File Date
		CA2650127AA			
	Universität Potsdam (Germany) Max-Planck-Gesellschaft Zur Foerderung Der Wissenschaften E.V.	**WO2009127441A2** WO2009127441A3	Transcription factors involved in drought stress in plants	Drought	2009-10-22 / 2009-04-16
	University of Wisconsin Wisconsin Alumni Research Foundation (USA)	**EP1267624B1** ZA0206046A WO0172130A3 WO0172130A2 US20030064893A1 US7101828 US6559099 MX2007159A JP2003528119T2 EP1267624A2 CA2403846AA BR0107928A AU1249490BB AU0149490A5 AT0403377E	Methods for enhancing plant health and protecting plants from stress	chilling, freezing, wind, drought	2008-08-06 / 2001-03-27
	VIB VZW (Belgium) Universiteit Gent (Belgium)	**WO2008155139A2** WO2008155139A3	Production of plants with improved stress resistance	abiotic stress resistance	2008-12-24 / 2008-06-18
	Wageningen Universiteit (Netherlands)	**US20100138962A1** WO2007148970C1 WO2007148970A8 WO2007148970A1 JP2009540822T2 EP2044107A1 CA2656258AA	Use of plant chromatin remodeling genes for modulating plant architecture and growth	cold stress, heat stress, salinity, wind, drought stress, water deficiency, water logging, metal stress, nitrogen stress	2010-06-03 / 2007-06-20
	Washington State University (USA)	**US20090320152A1** WO2007092907A3 WO2007092907A2 WO2007092505A3 WO2007092505A2 US20090320151A1	Mutation breeding for resistance to disease and other useful traits	drought resistant	2009-12-24 / 2007-02-07
	Yissum Research Development Company of the Hebrew University of Jerusalem (Israel)	**US20090165171A1** WO2007125531A2 WO2007125531A3 IL0194911A0 EP2016179A2	Transgenic Plants Exhibiting Increased Tolerance to Stress	abiotic stress tolerance	2009-06-25 / 2007-04-29

Appendix B.

Patent Claims on Climate-Ready Genes and Technologies in the South – By Country

The vast majority of patents and patent applications on climate-ready genes and technologies have been filed at the U.S. Patent and Trademark Office, the European Patent Office and at the World Intellectual Property Office. However, patent applications are also being filed at patent offices in the South – particularly in the major markets where the Gene Giants hope to do business: These include: Argentina (40), Brazil (40) , Mexico (37), South Africa (20), Peru (2) and the Philippines (1).

Note: Applications lodged at the World Intellectual Property Organization (WIPO) are *not* international applications. In patent applications published by WIPO, the applicant designates PCT (Patent Cooperation Treaty) member countries where he/she reserves the right to file a patent under the original filing date, without having to go to the expense of filing in each country. (The applicant has a period of at least 20 months from the original filing date to file a patent application in a designated country.) In other words, the WIPO patent applications serve as a "placeholder." To obtain a patent in any of the designated countries, however, the application must be filed in the national patent offices. WIPO patent applications are listed below because applicants typically designate many South countries.

Argentina

AR0047574A1
AR0053638A1
AR0054169A1
AR0054914A1
AR0055446A1
AR0056790A1
AR0058268A1
AR0058863A1
AR0060141A1
AR0061787A1
AR0064252A1
AR0065121A1
AR0065198A1
AR0066642A1
AR0066714A1
AR0066786A1
AR0066883A1
AR0067314A
AR0067318A1
AR0067376A1
AR0067672A1
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AR0068468A1
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AR0069542A1
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AR0069824A1
AR0069893A1
AR0069985A1
AR0070260A1
AR0070309A1
AR0070495A1
AR0070651A1
AR0070657A1
AR0070658A1
AR0070719A1

Brazil

BR0014750A
BR0015628A
BR0015631A
BR0015632A
BR0015633A
BR0015634A
BR0015635A
BR0107928A
BR0113512A
BR0208573A
BR0314389A
BR0316076A
BR0318314A
BR0407822A
BR0409326A
BR0409358A
BR0410992A
BR0411182A
BR0415345A
BR0416473A
BR0418000A
BR0418229A
BR9908523A
BRI0318314A
BRI0407822A
BRI0409326A
BRI0409358A
BRI0410992A
BRI0411182A
BRI0415345A
BRI0416473A
BRI0418000A
BRI0418229A
BRI0514003A
BRI0515902A
BRI0517007A
BRI0614367A2
BRPI0518249A
BRPI0519538A
BRPI0614367A

Mexico

MX2002PA04870A
MX2002PA04878A
MX2002PA04880A
MX2002PA04881A
MX2002PA04882A
MX2002PA04884A
MX2003669A
MX2004870A
MX2004878A
MX2004880A
MX2004881A
MX2004882A
MX2004884A
MX2005PA11774A
MX2005PA12565A
MX2007002083
MX2007005166

MX2007015716
MX2007159A
MX2008001513
MX2008002262
MX2008012252
MX2008015093
MX2008015936
MX2009005160
MX2009006660
MX2009007308
MX2009007494
MX3008922A
MX5003262A
MX5011774A
MX5012565A
MX8008765A
MX9011716A
MX9012451A
MX9012556A
MX9012880A

Peru

PE0900432A1
PE0901558A1

Philippines

PH0015644A

South Africa

ZA0206046A
ZA0301579A
ZA0407486A
ZA0503562A
ZA0506418A
ZA0509383A
ZA0605118A
ZA0606198A
ZA0704017A
ZA0704247A
ZA0708512A
ZA0709897A
ZA0802962A
ZA0803234A
ZA0803946A
ZA0803989A
ZA0804847A
ZA0804960A
ZA0805468A
ZA0805634A

WIPO Patent Applications

WO0004173A1
WO0009032755
WO0126459A2
WO0126459A3
WO0135725A1
WO0135726A1
WO0135727A1
WO0136444A1
WO0136597A1
WO0136598A1
WO0145492A2
WO0145492A3
WO0145493A2
WO0145493A3
WO0145494A2
WO0145494A3
WO0145494C2
WO0145495A2
WO0145495A3
WO0172130A2
WO0172130A3
WO0177161A2
WO0177161A3
WO0177311A2
WO0177311A3
WO0177354A2
WO0177354A3
WO0177355A2
WO0177355A3
WO0177356A2
WO0177356A3
WO0198480A2
WO0198480A3
WO0198480C1
WO02052012A2
WO02052012A3
WO02052012C1
WO02074917A2
WO02074917A3
WO02079403A2
WO02079403A3
WO02079403C2
WO0215675A1
WO0215675C1
WO0216625A2
WO0216625A3
WO0217430A1
WO0223974A1
WO0246442A2
WO03013227A2
WO03013227A3
WO03013227C2
WO03013228A2
WO03013228A3
WO03014327A2
WO03014327A3
WO03040171A2
WO03040171A3
WO03040322A2
WO03040322A3
WO03044190A1
WO03078629A1
WO03079765A2
WO03079765A3
WO03079785A1
WO03081988A2
WO03081988A3
WO04029227A1
WO04031349A2
WO04031349A3
WO04043145A2
WO04043145A3
WO04058963A
WO04058963A2
WO04076638A2
WO04076638A3
WO04090141A2
WO04090141A3
WO04090141C1
WO04092326A2
WO04092326A3
WO04099365A2
WO04099365C2
WO04104162A2
WO04104162A3
WO04108900A2
WO04108900A3
WO05038034A2
WO05038034A3
WO05047516A2
WO05047516A3
WO05061702A2
WO05061702A3
WO05065339A2
WO05065339A3
WO05075655A2
WO05075655A3
WO05122697A2
WO05122697A3
WO06013010A2
WO06013010A3
WO06018857A2
WO06027779A1
WO06032708A2
WO06032708A3
WO06044912A2

WO06045633A1
WO06069201A2
WO06073727A2
WO06073727A3
WO06074437A2
WO06074437C1
WO06081060A2
WO06094976A2
WO06094976A3
WO06111512A1
WO06133983A1
WO06134162A2
WO06134162A3
WO2007011479A2
WO2007011479A3
WO2007020198A2
WO2007020198A3
WO2007020638A2
WO2007020638A3
WO2007029270A2
WO2007029270A3
WO2007029271A2
WO2007030510A2
WO2007030510A3
WO2007047016A2
WO2007047016A3
WO2007049275A2
WO2007049275A3
WO2007052376A1
WO2007054522A1
WO2007064724A2
WO2007064724A3
WO2007069894A2
WO2007069894A3
WO2007075925A2
WO2007075925A3
WO2007077398A2
WO2007077398A3
WO2007077398C2
WO2007092505A2
WO2007092505A3
WO2007092907A2
WO2007092907A3
WO2007110314A2
WO2007110314A3
WO2007125531A2
WO2007125531A3
WO2007131699A2
WO2007131699A3
WO2007138070A2
WO2007138070A3
WO2007143819A1
WO2007148970A1
WO2007148970A8
WO2007148970C1
WO2008022570A1
WO2008037489A2
WO2008037489A3
WO2008043268A1
WO2008059048A1
WO2008074025A2
WO2008074025A3
WO2008075364A2
WO2008075364A3
WO2008075364A8
WO2008075364C1
WO2008076844A2
WO2008076844A3
WO2008083198A2
WO2008083198A3
WO2008083198A8
WO2008083198C1
WO2008092935A2
WO2008092935A3
WO2008095926A1
WO2008099013A1
WO2008100112A1
WO2008133643A2
WO2008133643A3
WO2008135296A2
WO2008135296A3
WO2008137108A2
WO2008137108A3
WO2008142034A2
WO2008142034A3
WO2008142036A2
WO2008142036A3
WO2008142036A8
WO2008142036C1
WO2008142163A2
WO2008142163A3
WO2008150165A1
WO2008150892A2
WO2008150892A3
WO2008155139A2
WO2008155139A3
WO2009003953A2
WO2009003953A3
WO2009013750A2
WO2009013750A3
WO2009016104A1
WO2009016232A2
WO2009016232A3
WO2009016232A8
WO2009016232C1
WO2009027313A2
WO2009027313A3
WO2009027539A2
WO2009027539A3
WO2009029739A2
WO2009029739A3
WO2009032755A2
WO2009032755A3
WO2009032755A4
WO2009034188A1
WO2009036400A2
WO2009036400A9
WO2009037279A1
WO2009037329A2
WO2009037329A3
WO2009039001A1
WO2009048847A1
WO2009048847A8
WO2009048847C1
WO2009049110A1
WO2009052476A2
WO2009052476A3
WO2009057061A1
WO2009060402A2
WO2009060402A3
WO2009060418A2
WO2009060418A3
WO2009061421A1
WO2009061422A1
WO2009061776A1
WO2009073844A1
WO2009077611A2
WO2009077611A3
WO2009082208A2
WO2009082208A3
WO2009083958A2
WO2009083958A3
WO2009083958A8
WO2009083958C1
WO2009086385A2
WO2009086385A3
WO2009092772A2
WO2009092772A3
WO2009094527A2
WO2009094527A3
WO2009101597A2
WO2009101597A3
WO2009106596A2
WO2009106596A3
WO2009108858A2
WO2009108858A3
WO2009111263A1
WO2009111263A1
WO2009111263A9

WO2009111263C2
WO2009120950A2
WO2009120950A3
WO2009124282A1
WO2009126359A1
WO2009127441A2
WO2009127441A3
WO2009127443A2
WO2009127443A3
WO2009129162A2
WO2009129162A3
WO2009132057A1
WO2009132779A1
WO2009135810A1
WO2009141332A1
WO2009141824A2
WO2009141824A3
WO2009142744A2
WO2009142744A3
WO2009143048A2
WO2009143048A3
WO2009143085A1
WO2009143120A2
WO2009143120A3
WO2009143120A9
WO2009143156A2
WO2009143156A3
WO2009143193A2
WO2009143193A3
WO2009143210A1
WO2009145935A1
WO2009146132A2
WO2009146132A3
WO2009152224A1
WO2010000794A1
WO2010007035A1
WO2010008760A1
WO2010011796A2
WO2010011796A3
WO2010012760A2
WO2010012760A3
WO2010018598A1
WO2010019838A2
WO2010019838A3
WO2010020555A1
WO2010020654A2
WO2010020654A3
WO2010020941
WO2010023310A2
WO2010023310A3
WO2010023320A2
WO2010023320A3
WO2010026219A2
WO2010026219A3
WO2010028278A2
WO2010028278A3
WO2010028307A1
WO2010028311A1
WO2010028315A1
WO2010034672A1
WO2010034681A1
WO2010036866A1
WO2010037714A1
WO2010040670A2
WO2010041236A1
WO2010041241A2
WO2010041968A2
WO2010042163A2
WO2010042419A1
WO2010042507A1
WO2010042557A2
WO2010046221A1
WO2010046471A2
WO2010049897
WO2010053621A2
WO2010058428A2
WO2010060099A2
WO2010060609A1
WO9809521A1
WO9938977A2
WO9938977A3

[1] Kaskey, J. and Ligi, A. "Monsanto, Dupont Race to Win $2.7 Billion Drought-Corn Market," *Business Week*, 21 April 2010, available at: http://www.businessweek.com/news/2010-04-21/monsanto-dupont-race-to-win-2-7-billion-drought-corn-market.html

[2] U.S. Department of Agriculture, 2008. *U.S. Biobased Products: Market Potential and Projections Through 2025.* Office of the Chief Economist, Office of Energy Policy and New Uses, U.S. Department of Agriculture. Prepared jointly by the Office of Energy Policy and New Uses, the Center for Industrial Research and Service of Iowa State University, Informa Economics, Michigan Biotechnology Institute, and The Windmill Group. OCE-2008-1, 293 pp.

[3] Kaskey, J. and Ligi, A. "Monsanto, Dupont Race to Win $2.7 Billion Drought-Corn Market," *Business Week*, 21 April 2010, available at: http://www.businessweek.com/news/2010-04-21/monsanto-dupont-race-to-win-2-7-billion-drought-corn-market.html

[4] Legal ownership of the patent or patent application is designated as the "assignee." However, patent rights may be traded, and the patent – some or all the rights – may be licensed to another party. This information is not disclosed on patent documents.

[5] Canon, Slate. "BASF, Monsanto expand collaboration," *Delta Farm Press*, 8 July 2010. http://blog.deltafarmpress.com/briefingroom/2010/07/08/basf-monsanto-expand-collaboration/

[6] Monsanto News Release, "InterGrain and Monsanto Announce New Wheat Breeding Collaboration Monsanto to share technology, germplasm with Australian breeding leader; makes equity investment," Aug 26, 2010. http://monsanto.mediaroom.com/intergrain-monsanto-new-wheat-breeding-collaboration

[7] BASF News Release, "BASF Plant Science and Monsanto to expand their collaboration in maximizing crop yield," July 7, 2010. http://www.basf.com/group/pressrelease/P-10-350

[8] Peter Eckes, President of BASF Plant Science, "A grounded approach to agricultural sustainability," Media Summit, Chicago, Illinois (USA), 9 June 2010. http://www.agro.basf.com/agr/AP-Internet/en/function/conversions:/publish/upload/news_room/peter-eckes-presentation-chicago.pdf

[9] Dupont News Release, "DuPont Leader: Drought Tolerant Crops Critical to Increasing Food Production," Aug. 4, 2010. http://www.pioneer.com/web/site/portal/menuitem.50ccfe7db37d91e389108910d10093a0/

[10] Personal communication with Jeffrey Rowe, Pioneer Hi-bred (DuPont).

[11] *Ibid.*

[12] http://www2.dupont.com/Media_Center/en_US/daily_news/august/article20100805.html

[13] http://www.evogene.com/news.asp

[14] Personal communication with Eric Rey, CEO, Arcadia Biosciences, 17 September 2010.

[15] http://www.enn.com/agriculture/article/28856

[16] Personal communication with Eric Rey, CEO, Arcadia Biosciences, 17 September 2010.

[17] Syngenta, "2010 Half Year Analysts' Call Script**,"** Basel, Switzerland, July 22th, 2010. http://www.zeneca.com/en/investor_relations/pdf/07.22.2010%20Syngenta%20H1%20Script.pdf

[18] Syngenta News Release, Syngenta Seeds, Inc. Launches Agrisure Artesian(TM) Technology, First Water-Optimized Technology for Corn Hybrids, July 27, 2010.

[19] http://www.wbcsd.org/DocRoot/3Eg5u08N3UAYciRKcigo/Land%20Use_220310.pdf

[20] According to the U.S. PTO, the GenBank database (an annotated collection of all publicly available DNA sequences) contained 651,972,984 nucleotides in 1,021,211 sequences in 1996. By February 2006, the GenBank database contained 59,750,386,305 bases in 54,584,635 sequence records or about a ninety-one-fold increase in the number of nucleotides and about a fifty-four-fold increase in the number of sequences. (Today the figure exceeds 107,533,156,756 bases. http://www.ncbi.nlm.nih.gov/genbank/).

[21] http://www.ncbi.nlm.nih.gov/sites/genome

[22] http://www.ncbi.nlm.nih.gov/genomes/PLANTS/PlantList.html#C_SEQ

[23] http://www.ncbi.nlm.nih.gov/sites/entrez?db=genomeprj&cmd=Retrieve&dopt=Overview&list_uids=9512

[24] For detailed background, see *ETC Communique*, "Syngenta – The Genome Giant? January/February 2005. http://www.etcgroup.org/upload/publication/73/01/com_syngenta_final.pdf

[25] See, for example: ETC Group, Geno-Types, "DeCodeing the Clinton/Blair Announcement," 26 March 2000. http://www.etcgroup.org/upload/publication/332/01/geno_decoding.pdf

[26] http://www.patentlens.net/daisy/RiceGenome/3648.html

[27] http://www.patentlens.net/daisy/RiceGenome/3662/3108.html

[28] http://www.patentlens.net/daisy/RiceGenome/3663/2806.html

[29] 1316 O.G.13, 27 March 2007

[30] Richard Van Noorden, "DNA patent ruling hinders Monsanto**,"** *Nature*, 9 July 2010. http://www.nature.com/news/2010/090710/full/news.2010.345.html

[31] *Monsanto Technology LLC v Cefetra BV and Others*, Case C-428/08.

[32] Matthew Royle, "Purpose-Dependent Protection for DNA," *Genetic Engineering & Biotechnology News*, September 1, 2010, p. 9.

[33] *Ibid.*

[34] http://www.patentlens.net/daisy/RiceGenome/3660/3609.html#dsy3609_specify
[35] http://www.uspto.gov/web/offices/pac/mpep/documents/2400_2422.htm
[36] http://www.patentlens.net/daisy/RiceGenome/3660/3609.html
[37] See Patent Lens tutorial for more detailed information. http://www.patentlens.net/daisy/patentlens/4125.html
[38] ETC Group News Release, "REVOKED!! Monsanto Monopoly Nixed in Munich," 3 May 2007. www.etcgroup.org
[39] ETC Group News Release, "Enola Patent Ruled Invalid: Haven't we Bean here before?" 14 July 2009. www.etcgroup.org
[40] "Transcription factors" are used to activate cascades of genes that function together to enhance stress tolerance. Transcription factors refer to a class of genes that control the degree to which other genes in a cell are activated. Transcription factors recognize and bind to regions of DNA that have a specific sequence in the promoters of the genes they regulate.
[41] From the patent application abstract, US 2009/0300980 A1 (patent application). Corn with transgenic insect protection traits utilized in combination with drought tolerance and/or reduced inputs particularly fertilizer.
[42] "On average, only about one-third of new-drug applications submitted to the FDA are for new molecular entities. Most of the rest are either for reformulations or incremental modifications of existing drugs or for new "on-label" uses (additional health conditions for which an existing drug can be prescribed). None of those types of new drugs involve a new active ingredient, although firms must conduct clinical trials to gain FDA approval for new uses." Source: Congress of the United States, Congressional Budget Office, *Research and Development in the Pharmaceutical Industry*, October 2006, pp. 14-15. http://www.cbo.gov/ftpdocs/76xx/doc7615/10-02-DrugR-D.pdf
[43] Statement of Mr. Gerald Steiner, Executive Vice President, Sustainability and Corporate Affairs, Monsanto Company, before the House Foreign Affairs Committee, July 20, 2010, available on Monsanto's website: http://www.monsanto.com/newsviews/Pages/Feed-the-Future-Initiative.aspx
[44] Bernard Muthaka, "New maize variety to counter drought," The New Vision website, 21 July, 2009. http://www.newvision.co.ug/D/9/37/688561
[45] Statement of Mr. Gerald Steiner, Executive Vice President, Sustainability and Corporate Affairs, Monsanto Company, before the House Foreign Affairs Committee, July 20, 2010, available on Monsanto's website: http://www.monsanto.com/newsviews/Pages/Feed-the-Future-Initiative.aspx
[46] Monsanto News Release, "Monsanto Will Undertake Three-Point Commitment to Double Yield in Three Major Crops, Make More Efficient Use of Natural Resources and Improve Farmer Lives: Will Also Fund Public Sector Research for Wheat and Rice Breakthroughs"
Jun 4, 2008. http://monsanto.mediaroom.com/index.php?s=43&item=607
[47] African Agricultural Technology Foundation, News Release, *AATF Marks Second Anniversary Since Formation of WEMA Project*, 19 March 2010.
http://www.aatf-africa.org/userfiles/PressRelease-WEMAAnniversary.pdf
[48] *Ibid.*
[49] Personal communication with Grace Wachoro, AATF, September 17, 2010.
[50] *Ibid.*
[51] *Ibid.*
[52] PIPRA is an organization that supports intellectual property and commercialization strategies for non-profit and humanitarian projects. http://www.pipra.org/
[53] Pioneer News Release, "Public-Private Partnership to Improve Maize Harvests 30-50 percent," Feb. 17, 2010. http://www.pioneer.com/web/site/portal/menuitem.46a38374fe929fcde580e580d10093a0/
[54] Elizabeth Gibney, WIPO Scheme to give patents to poorest," *Research Fortnight*, 21 April 2010. http://www.aatf-africa.org/userfiles/WIPO-scheme.pdf
[55] *Ibid.*
[56] There is no such thing as an international patent. In patent applications published by WIPO, the applicant designates PCT member countries where he/she reserves the right to file a patent under the original filing date, without having to go to the expense of filing in each country. (The applicant has a period of at least 20 months from the original filing date to file a patent application in a designated country.) In other words, the WIPO patent application serves as a "placeholder." To obtain a patent in any of the designated countries, however, the application must be filed in the national patent offices.
[57] http://www.syngentafoundation.org/index.cfm?pageID=533
[58] General News of Africa (GNA), "Experts urge Ghanaians to use and apply modern biotechnology," 26 August 2010. http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=189187
[59] http://www.usaid.gov/our_work/agriculture/biotechnology/gda_indian_rice_wheat.html
[60] According to Monsanto's website, Monsanto Holdings Private Limited (MHPL) is a 100% wholly-owned subsidiary of Monsanto Company and holds a 26% Stake in Mahyco. Mahyco Monsanto Biotech (India) Limited is a 50:50 joint venture between Mahyco and MHPL. http://www.monsanto.com

[61] Mittler, Ron and Blumwald, Eduardo. "Genetic Engineering for Modern Agriculture: Challenges and Perspectives," *Annu. Rev. Plant Biol*. 2010. 61:443–624.
[62] Andrew Pollack, "After Growth, Fortunes Turn for Monsanto," *New York Times*, 5 October 2010.
[63] *Ibid.*
[64] Kilman, Scott. "Superweed Outbreak Triggers Arms Race," *Wall Street Journal,* 4 June 2010.
[65] *Ibid.*
[66] Galluzzi, G., P. Eyzaguirre and V. Negri "Home gardens: neglected hotspots of agro-biodiversity and cultural diversity," *Biodiversity Conservation*, published online 17 September 2010.
[67] *Ibid.*
[68] *Ibid.*
[69] Zareen Bharucha and Jules Pretty, The roles and values of wild foods in agricultural systems," Phil. Trans. R. Soc. B, September 27, 2010 365:2913-2926. Available online: http://rstb.royalsocietypublishing.org/content/365/1554.toc
[70] *Ibid.*
[71] *Ibid.*
[72] Navdanya/Research Foundation for Science, Technology and Ecology, *Biopiracy of climate resilient crops: gene giants steal farmers' innovation of drought resistant, flood resistant & salt resistant varieties.* (New Delhi, India) 2009.
[73] National Research Council of the National Academies, *Lost Crops of Africa: Volume II: Vegetables,* National Academies Press (2006). http://www.nap.edu/openbook.php?record_id=11763
[74] National Research Council of the National Academies*, Lost Crops of the Incas: Little-Known Plants of the Andes with Promise for Worldwide Cultivation,* National Academies Press (1989). http://www.nap.edu/openbook.php?record_id=1398&page=1
[75] Bar-Even, A., Noor, E., Lewis, N. E., & Milo, R. (2010). Design and analysis of synthetic carbon fixation pathways *Proceedings of the National Academy of Sciences*. http://www.pnas.org/content/107/19/8889
[76] *Ibid.*
[77] Personal communication with Ron Milo, Weizmann Institute.

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