February 1, 2023

Katherine K. Vidal
Under Secretary of Commerce for Intellectual Property
Director of the United States Patent and Trademark Office

RE: Request for Comments on USPTO Initiatives to Ensure the Robustness and Reliability of Patent Rights (Docket No. PTO-P-2022-0025)

Dear Director Vidal:

Thank you for the opportunity to provide comments on proposed initiatives directed at bolstering the robustness and reliability of patents to incentivize new inventions while facilitating the broader dissemination of public knowledge to promote innovation and competition. Organic Seed Alliance (OSA) is a mission-driven organization that works nationally to ensure that farmers have access to the seed they need to be successful, and we achieve this mission through participatory plant breeding and research, practical education, and policy advocacy.

The Biden Administration's July 9, 2021, Executive Order, titled "Promoting Competition in the American Economy," communicates a commitment to tackle anti-competitive conduct in agriculture and identify policy solutions that will strengthen the foundation and framework for antitrust law enforcement. President Biden's Executive Order engenders significant hope among farming communities and justice advocates that change is coming. This sentiment of hope was similarly felt during the Obama Administration, when the US Departments of Agriculture and Justice initiated an historic examination of competition concerns within agriculture by hosting five competition workshops across the US in 2010.

At these workshops, concerns about utility patents on seed were not only shared through public testimony by many farmers, but also by the assistant attorney general for the DOJ's Antitrust Division at the time, Christine Varney, who highlighted the problem of patents in her opening remarks on March 12, 2010, in Ankeny, Iowa: "You know, patents have in the past been used to maintain or extend monopolies, and that's illegal, and you can be sure, Secretary, that we are going to be looking very closely at any attempt to maintain or extend a monopoly through an abuse of patent laws."

Unfortunately, these 2010 workshops, hearings, and public comments resulted in no meaningful action, especially in the seed industry.

Given this precedent under President Biden's previous tenure in the White House, we begin our comments by underscoring how important it is to have this inquiry coming from the Executive Branch and to see a primary focus on seed. A targeted examination of the seed trade through a combined antitrust and IP system lens is long overdue, and we applaud the Administration for shining light on this connection. Understanding the tension between antitrust law and IP law is especially important to uncovering solutions for enhancing competition in the seed industry, because while several agricultural sectors could also be described as having an oligopoly structure, including agrochemicals and fertilizers, seed is unique from every other input market because it is a living, natural resource. In other words, seed is not manufactured in a facility, but represents generations of natural evolution both alongside and in absence of human intervention. In this way, grower decisions pertaining to seed are not only economical; for many, the decisions are ethical and cultural. The cultural heritage of our seed supply makes ownership claims via patents that much more fraught when considering the history of appropriation (stolen land and seeds), not to mention the original intent of IP laws: to incentivize innovation, not the monopolization of markets.

Of all the IP tools associated with seed, we are most concerned about the immediate and long-term impacts of utility patents on plant varieties and genetic traits. Our concerns are two-fold: First, it was never Congress' intent for utility patents to be awarded for products of nature; no one should "own" naturally occurring and self-replicating forms of nature, regardless of the methods used to identify or alter them. Second, utility patent holders enjoy far-reaching control over access and use of their protected products and can disallow research, plant breeding, and seed saving. A single patent can cover the plant, seed, tissue cultures, future generations, crosses with other varieties, and the methods used to produce it. While the Plant Variety Protection Act has exemptions for breeders and farmers, utility patents can be legally enforced to forbid access to protected material for purposes of research, plant breeding, and on-farm seed saving. Patents therefore remove valuable genetic material from the diverse pool of resources breeders rely on for improving agricultural crops. When access to breeders and researchers is provided, it often hinges on restrictive licensing agreements, including restrictions on research questions and publishing findings. These restrictions are a disservice to society and make our food system less secure in the face of climate change.

The patent system is failing in its mission to strike a balance between benefiting inventors and benefiting the public good

Understanding "public access" to patented varieties is confusing and an onerous exercise in navigating the IP system and communicating with the patent owner (if that's even possible). In many cases, a grower who wants to use patented seed must sign and abide by a highly restrictive contract – a "limited use agreement" – or they agree to restrictive terms through a "bag tag" licensing agreement simply by opening a packet or bag of seed. In the modern system dominated by utility patents, research and seed-saving on new plant varieties and seed technologies have been foreclosed because utility patents do not come with seed-saving or research exemptions.

Furthermore, patents have led to skyrocketing seed prices, especially biotech field crops (e.g., corn, soybeans, and cotton), and these prices have not been offset by productivity.

We find patent claims on plant genetic traits and phenotypes that exist in nature particularly problematic. There are patents that claim exclusive access over the ability to cross varieties in the National Plant Germplasm System (NPGS) known to have desirable disease and pest resistance. For example, US Patent No. 8,859,859B2 claims "a method of producing a cucumber plant having resistance to Downy Mildew (DM) comprising the steps of (a) crossing a cucumber plant of accession PI197088 with a second cucumber plant having at least one desired trait; and (b) selecting at least a first progeny cucumber plant resulting from the crossing that comprises resistance to Downy Mildew and the desired trait." PI197088 is an accession (a group of related plants from a single species which are collected at the same time and location) in the NPGS that, prior to the Seminis application, was being used by public breeding programs specifically for its high level of DM resistance. In other words, this is a method of producing a cucumber plant with DM resistance by crossbreeding a cucumber plant from a group known for its DM resistance with another cucumber plant. Nothing about it is inventive.

Another example is US Patent No. 9,173,355B2, which claims "carrots having high lycopene content" (very red carrots, which exist in nature without human intervention) through the very common (and age-old) practice of crossing plant varieties to make hybrids. Plants with the same characteristics as products of nature are not eligible for patent protection, especially when they are created using practices humans have used for a very long time.

Similarly, there is a patent claiming "red lettuce" (US Patent No. 8,143,487B2). Red lettuce is a head lettuce variety that is red to the heart. This trait occurs in nature without human intervention, but challenging to breed for, because the red pigment in lettuce typically requires the leaves be exposed to the sunlight's UV-radiation for the anthocyanin that causes the color to synthesize. Since sunlight does not reach the center leaves of a dense head of lettuce, breeders are developing varieties that are more likely to yield red lettuce by selecting for traits that result in a red-to-the-heart lettuce without depending on light reaching the core. The red lettuce patent covers a color change in lettuce that is bred using conventional and generic breeding practices. Neither the practices of establishing red-to-the-heart lettuce nor the idea of breeding for such a trait is inventive. The fact that you can select for this trait demonstrates it is a naturally occurring genetic trait.

One plant breeder described the trait as the "Holy Grail" of lettuce because "what everybody wants in a lettuce is a lettuce that is red in the core."[1] This breeder described having worked on his own red-to-the-heart lettuce variety prior to 2005.

The patent claims that this red lettuce is different from "prior art" because it does not need UV-radiation to have a red color, even though the patent describes breeding for this trait by selecting

[1] Personal communication with Frank Morton, December 16, 2013.

lettuces that tend toward heart redness, including classically bred varieties available in the marketplace, such as varieties that exhibit red speckling in the heart. The patent describes that none of the lettuce varieties used to breed for the red lettuce "have the characteristic red leaves in the heart of the head." Therefore, the patent claims as an invention the "unique and new combination of genes from these red and green parent varieties, which is providing the completely red leaves in the heart of the head."

In the words of this same breeder who developed his own red-to-the-heart lettuce, "If this is about novelty and invention, I don't understand the inventiveness of just describing your latest lettuce that you've bred…"[2] In other words, this patent example includes breeding practices and breeding goals that are standard.

"I do not believe that because a human notices that a plant has a useful trait, that that human should be able to monopolize the trait," shared the breeder. "That doesn't seem right. I think it goes against the tradition of agriculture and I think it allows the concentration of economic power in farming."[3]

There are patents on "heat-tolerant broccoli" (such as US Patent No. 7,829,763B2) that cover broccoli plants bred to produce commercially acceptable heads under warmer growing conditions. Broccoli is a cool weather crop, so identifying plants that perform well under heat stress allows these plants to be grown across a wider range of geographies. The heat-tolerant broccoli patent makes broad claims to broccoli traits for heat tolerance by including all phenotypic characteristics in its description. By describing phenotype as opposed to genotype, the observable physical characteristics of the broccoli are claimed, making for a markedly broad sweeping claim to the ownership of a trait that is naturally occurring. As a result, the claims cover practically any broccoli plant with observable heat-tolerance, regardless of how it is bred or what its genotype is.

Furthermore, the progeny of the protected broccoli plants are also claimed in the patent, and the patent explicitly denies other breeders the right to develop new varieties from this protected material by restricting the practices of: "selecting, crossing, breeding or otherwise altering the broccoli plants of this invention." When describing the heat-tolerant broccoli patent, one breeder shared: "The thing about utility patents is they last 20 years. They are absolute, meaning you can't do a thing with those seeds, nothing. You can't research with them, nothing. It closes that trait or variety from all plant breeding for 20 years. That's what a utility patent does."[4]

This plant breeder had been working on heat-tolerant broccoli prior to discovering the patent. He shared about discovering the patent, "Generally you don't know what's going on beforehand." Sometimes fully developed plant varieties are never released after these accidental patent discoveries, because plant breeders fear they are infringing the patent.[5]

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[2] Personal communication with Frank Morton, December 16, 2013.
[3] Personal communication with Frank Morton, December 16, 2013.
[4] Personal communication (anonymous), December 16, 2013.
[5] Personal communication (anonymous), December 16, 2013.

While the Plant Variety Protection Act provides a more thoughtful system by recognizing the need for breeders to use germplasm to develop new varieties, including crossing varieties as just described, the utility patent system does not allow for these common breeding practices.

The protected traits and plant lines described above are naturally occurring. The material and methods used to produce them are conventional, routine, and well-understood. They contain nothing inventive that could make them eligible for patent protection. These are just a few examples out of many.

There are large variations in patent grant rates for plant varieties among different Art Units and examiners in the USPTO. Coupled with the fact that individual examiners have a large degree of flexibility in choosing which databases and search strategies to use, this may indicate the system as a whole is too subjective. In addition, because seeds are living, naturally replicating, and naturally variable organisms, any plant that exists in nature could be considered prior art. Therefore, to do a truly exhaustive prior art search, especially for patent applications that claim specific phenotypes, a patent examiner would have to be aware of every example of the plant in question and each particular array of traits — an impossible task for any one person, no matter the time constraints.

Our understanding is that previously published patent applications account for the majority of prior art referenced by both applicants and examiners, resulting in a positive feedback loop in which the documentation most likely to prevent problematic patent applications from being granted are other granted patents – a system that devalues the knowledge and work of people who are unable or unwilling to pursue them.

When examining utility patents to determine if "rewarding invention through protection from competition for a fixed term" is working well for plant breeders, the seed industry, and the growers and consumers they support, the first question to ask is: Who is benefiting most from the current IP system?

One way to answer this question is to look at who owns the most utility patents on crops. Utility patents are expensive, so it's no surprise that the top two industry leaders that have profited tremendously from IP rights on seed are also the top two owners of utility patents on plant varieties. Between 2004 and 2008, the two largest seed companies in the world (at the time, Monsanto and DuPont) accounted for 60% of patent applications on plant varieties.[6] Because this research has not been updated, we do not have access to current statistics on utility patent ownership. It would be helpful to have transparent data from the USPTO on utility patent ownership on plant varieties, plant genetic traits, and phenotypes.

[6] Pardey, Philip, B. Koo, J. Drew, J. Horwich, and C. Nottenburg. 2013. "The evolving landscape of plant varietal rights in the United States, 1930 – 2008," *Nature Biotechnology*, January.

The two companies just mentioned were acquired by other firms in 2017 (DuPont by Dow) and 2018 (Monsanto by Bayer). IP rights on plant varieties and genetic traits are what make these companies valuable to investors and competitors. The enormous profits from licensing patented products, or acquiring patent holders, led to dozens of acquisitions and mergers in a short timeframe, thus the oligopoly in the seed industry that we have today.

Yet, contrary to the claim that patents are necessary for incentivizing new product development, patents and restrictive licensing agreements have not spurred increased innovation in crop improvement. For example, in plant biotechnology, USDA documented that as the corn, soybean, and cotton markets became more concentrated "private research intensity dropped or slowed" relative to what would have occurred without consolidation.[7] That's why leading economists have long warned that firms become complacent and less likely to innovate when they can produce less and obtain a higher price for their input.[8] Market protection in the form of antitrust oversight is needed to prevent further concentration of economic power and to encourage innovation. The trend in less innovation as antitrust law enforcement decreased is well documented in other industries as well.[9]

Utility patents suppress innovation in the public plant breeding sector

There is no question that utility patents on crop types, plant varieties, genetic traits, and phenotypes suppress innovation, including in the public sector. One example is the patent on "bean-nut popping beans" (6,419,976), a type of bean that originated in the Andes region of South America at high altitudes and in warm climates. These beans are commonly found in Peru and Bolivia, where they are called "nuñas" and sold on the street like popcorn.

Oregon State University plant breeder Jim Myers had developed a North American-adapted popping bean that he was ready to release when he accidentally stumbled upon the patent while teaching a student how to search the USPTO database. This meant that the public breeding work he'd been doing for years, along with two other breeders at Colorado State University and the University of Wisconsin - Madison was infringing on this patent, as the entire plant had been claimed as an invention by Inland Empire Foods, Inc.

The patent claims any variety of popping beans that are adapted for northern climates, or those climates with a growing season shorter than 100 days. The patent also claims any bush beans adapted to flower "when day lengths are greater than or equal to 13 hours." The process of developing these northern climate bush beans is also claimed, ultimately disallowing anyone else

[7] Fernandez-Cornejo, Jorge and D. Schimmelpfennig. 2004. AmberWaves, "Have Seed Industry Changes Affected Research Effort?" USDA/ERS, February.
[8] Harl, Neil E. 2000. "The Structural Transformation of the Agricultural Sector," In *A Food and Agriculture Policy for the 21st Century, Organization of Competitive Markets,* Organization for Competitive Markets.
[9] Open Markets Institute, "Innovation & Monopoly," https://www.openmarketsinstitute.org/learn/innovation-monopoly

from breeding for these same qualities, even if they arrive at the desired trait using a different selection process. The broad patent also claims the "leaves, stem, pollen, plant cells and seed." The patents also claim all nuña beans in the USDA Plant Introduction Collection.

With this knowledge, all three breeding programs shelved their projects and never released their popping bean varieties. **And neither did the patent owner.** This example demonstrates how utility patents lock up plant genetics for decades—in this case a culturally important crop—and halt access to a food crop and any opportunity to further adapt this crop to changing climates. In this case, the patent suppressed the competition of three public plant breeding programs and halted innovation efforts that would have resulted in new seeds, crops, and markets for growers and consumers.

Organic Seed Alliance regularly fields questions from seed growers and plant breeders related to patent examples they come across on plants and genetic traits. Their confusion about what is covered by these patents is warranted, since patent descriptions are seemingly impossible to translate by anyone other than a patent attorney. Some of these examples include a patent on pink tomatoes (i.e., a phenotype that has long existed in heirloom varieties), drought tolerant plants, and "plants with an intense fruit phenotype." These examples and more than 100 others were listed in a letter sent by BASF to communicate their patent applications and awards to hundreds of vegetable seed companies (see Appendix).[10] The broad claims listed in this letter provide good evidence as to why there is more confusion than ever in the seed industry about what is being patented and why. In some cases, this confusion leads to undue fear among smaller seed companies and breeders working with these crops and traits. Our understanding, too, is that it's illegal to claim rights when patents are pending.

Some of these protected traits are naturally occurring. They are neither novel nor constitute an invention by humankind, and they do not pass the nonobvious test. Furthermore, the broad nature of utility patents – take the Northern popping bean example above – are decidedly unjust. Many patents claim ownership over the methods used to develop a plant, the genetic traits within, and progeny produced. Furthermore, many companies now rely on utility patents for claiming ownership of finished varieties instead of applying for a PVP certificate, a more appropriate IP protection for a finished variety and one that supports, rather than hinders, market competition.

In our view, what these patent descriptions represent is time and resources: time spent documenting a plant developer's methods (which are typically not novel), germplasm lines, and specific characteristics achieved, regardless of whether these germplasm lines already existed, or these characteristics have already been achieved by others (perhaps with different germplasm lines and methods), or the "invention" is obvious to other breeders. In other words, documentation does not make an improved plant variety novel enough to warrant a patent for invention.

[10] Hubbard, Kiki and Cathleen McCluskey. 2020. "How Patents Threaten Small Seed Companies," Civil Eats, September 11.

The takeaway: Increased market power results in access to more resources, time, and staff – including a legal team – allowing larger companies to lock out competition simply by having the resources to pursue more utility patents on plant genetic resources.

Utility patents suppress innovation in organic seed

We are often asked how the IP system impacts the organic seed market. One way organic plant breeders and seed producers are impacted is through limited access to germplasm. For example, hybrid seed corn companies that do not have the financial resources for their own breeding programs rely on licensing inbred lines for their organic seed production. The largest biotechnology companies (the dominant players in the seed industry) own most of these lines and have been unwilling to license them in an untreated form; that is, without chemical seed treatments prohibited in the national organic standards. They have also been unwilling to allow seed companies to test for unwanted, genetically engineered (GE) traits (genetic engineering is an excluded method in the national organic standards). It is illegal to use these lines without a license, and the licenses prohibit testing for these patented traits. This puts companies that want to protect their reputation as a supplier of non-GE seed for organic production in a vulnerable position of risking litigation if they decide to test illegally.

The president of Albert Lea Seed House, Mac Ehrhardt, estimates that of more than 1,940 hybrid lines available, only 8% are available as a non-GE line and in an untreated form. Although these numbers were collected a few years ago and the total number of lines might be different, Ehrhardt says that the order of magnitude is still the same today – "access is extremely limited."[11] Field corn is one of the most widely planted organic crops in the US and yet choice in organic seed continues to be limited due to lack of access to appropriate lines. The lack of access to more appropriate lines is a barrier for expanding choice in organic hybrid seed corn, since lines can neither be treated with a chemical prohibited in the organic standards nor contain a GE trait. The lack of genetic diversity planted to US corn acres also makes our food supply less secure.

This is just one example of how utility patents on plant genetics foster anticompetitive conduct in the market to the detriment of US farmers and a diverse food supply.

To promote access to germplasm, there must be universal exemptions for plant breeding, research, and seed saving across the IP system, including utility patents. Given the prevalence of restrictive IP on our seed supply, requiring these exemptions across the IP system is the single most impactful strategy for promoting market competition.

Some suspect that major seed companies might intentionally obscure the identity of varieties they patent to skirt certain patent requirements. For example, Jim Myers, the Oregon State University tomato breeder who introduced the first domesticated anthocyanin-pigmented tomato to the

[11] Personal communication, June 14, 2022.

market, said that he has found patents for anthocyanin-pigmented tomatoes that make no mention of the breeding history required to achieve that phenotype:

> Now what I'm seeing in utility patents – and patent examiners are allowing this—is that companies are kind of glossing over the breeding history. I don't think they should be allowed to do that. For example, the Yoom tomato. This is Syngenta's Indigo tomato. They have it utility patented. I found what I think is the utility patent for Yoom. And [in the patent application,] the variety is numbered, it's not named. They're very cagey in there. They don't even really talk about the anthocyanins or the pigments of the fruit…

Patenting a variety by its number rather than its market name makes it extremely difficult for the public to ascertain whether the variety they've purchased is protected by IP.

The public needs access to more information about utility patents

For decades, the USPTO has been aware that its database for granted and pending utility patents was cumbersome, difficult to search, and "did not provide users with the convenience or similar functionality as those used by [US PTO] examiners."[12] Even patent librarians formally trained by the USPTO tended to use either Google's patent search function or the European database Espacenet. It is unreasonable to expect that farmers, seed growers, and plant breeders — those most equipped to answer questions about an application's legitimacy — would have the time to monitor such a system, especially considering that many farmers have limited access to technological resources. The USPTO attempted to address this issue last year with the introduction of the Patent Public Search tool, a web-based service that allows the public to search pending and granted public applications under one interface. While purported to be more user-friendly, the application still requires the user to have a computer that can run the program as well as working knowledge of field codes, Boolean, and proximity operators, as well as the time to search for pending applications pertinent to the crops they work with.

As of now, the submission of third-party references of prior art are quite rare. In February 2022, a writer at patentlyo.com reported that "Out of every 10,000 issued patents [across all sectors], only about 14 include prior art submissions from third parties."[13] While the efficacy of the Patent Public Search tool has yet to be seen, the fact remains that breeders and seed growers who have no intention of pursuing utility patents for the seeds they work with should not be expected to defensively monitor patent applications that might encroach or inhibit their freedom to continue working with those seeds.

Further, 35 U.S.C. § 122 provides patent applicants the ability to request that their application not be published so long as the patent is only filed in the US and not internationally. This means that some patents may not even be publicly available for review until after the patent is already granted. The

[12]https://www.uspto.gov/about-us/news-updates/uspto-launches-new-patent-public-search-tool-and-webpage
[13] Crouch, Dennis. 2022. "USPTO Third Party Submissions," Patentlyo. February 2.

public, therefore, is inhibited in its ability to support the prior art search, both by a lack of access to information, and by the lack of resources to execute the kind of searching and monitoring such a process would require to be effective. In sum, the USPTO should not expect the public to fill the gaps patent examiners are unable to meet due to insufficient agency funding, when in fact the problem persists that conducting prior art searches on plant phenotypes is an impossible task at the outset. The USPTO should collaborate with the USDA to monitor these patents and patent applications per our recommendations below.

Recommendations

The current IP system, as it relates to seed, is suppressing competition and innovation, and infringes on the freedom of seed growers, plant breeders, researchers, and farmers. It is our view that the current patent system is being misused to the detriment of public and private research, choice in the seed marketplace, and the resiliency of our food and farming systems. Our recommendations include:

- **We believe Congress should restore the Plant Variety Protection Act as the exclusive form of intellectual property rights covering sexually reproducing plants.**
- **In the meantime, the USPTO should clarify its patent examination procedures and designate an effective way for breeders to submit new varieties without having to file an application or pay a fee.**
- **To increase transparency, patent applicants should not be allowed to be kept from the public while under review.**
- **It would be helpful to have transparent data from the USPTO on utility patent ownership on plant varieties, plant genetic traits, and phenotypes.**
- **The USPTO can leverage the existing patent librarian network to disseminate information about patents associated with seed.**
- **The internal USPTO policies and procedures could be made consistent to cover all databases and resources regarding prior art.**
- **The USPTO should explore integrating a mechanism for listing all current market names associated with patents related to plant varieties.**
- **The USPTO should work with the USDA to develop more detailed instructions on the application of Section 101 to agriculture-related patent applications.** The USPTO and USDA should work together to develop guidance that prevents ineligible agriculture-related patents. As a starting point, they should partner to establish a coordinator position and office to serve as a liaison between the two agencies. This would improve transparency and monitoring of plant genetics protected by patents, address complaints and concerns

from affected individuals, organizations, and communities, and gather useful information for crafting more effective policies and guidance in the future. The office should also collaborate on providing the public with the information it needs, such as a regularly released newsletter and easily navigable database specific to plants/genetic traits that are under review for a utility patent or already protected by law.

There is an urgent need for this kind of assistance and resources. The USPTO's existing databases continue to be challenging to navigate. We regularly hear from seed growers, farmers, plant breeders, and seed savers who are concerned about the dearth of information about IP protections on the seed they buy and worried about saving, breeding, or growing that seed to sell without that knowledge. We also hear from plant breeders who struggle to navigate the IP system when they want to release a variety they have developed. For plant breeders and seed growers not affiliated with or connected to a university program or a commercial seed company, it is very difficult to understand what they should do to identify and respect the IP rights of others or how to obtain and enforce IP protections for their own advances.

- **Update the Patent Subject Matter Eligibility Guidance** In our comments submitted to the USPTO on October 15, 2022, we recommended the following: 1) Remove parts of the guidance that are inconsistent with the law—in particular, the "practical application" test—which have allowed patents on products of nature when integrated into practical applications regardless of whether they are markedly different from products of nature or contain inventive concepts; and 2) include instructions on plants that occur in nature and/or are produced by using laws of nature (e.g., crossing plants will produce offspring with a varying range of traits found in the crossed plants).

The public must be protected from patent claims that ultimately hinder innovation, independent research, and the resiliency and security of our seed and food supplies. The balance of power is currently tipped toward the rights of powerful companies with extensive IP portfolios and away from the public interest, particularly the interests of seed growers, plant breeders, farmers, and seed savers. Patent applications claiming agriculture-related products of nature and natural laws require rigorous scrutiny when determining patent eligibility.

Thank you again for the opportunity to provide comments. Please let us know how we can further support your efforts.

Sincerely,

Kiki Hubbard
Director of Advocacy & Communications
Organic Seed Alliance
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We create chemistry

Appendix B: BASF letter to seed companies communicating patent rights

Nunhems BV, Nunhem, The Netherlands

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U2004.0010 / Nunhems' Utility Patent applications

NUNHEMS B.V. is an international vegetable seed company which is occupied with research, sales, marketing and production of (seed of) vegetable varieties for the professional market. It has registered offices at Napoleonsweg 152, 6083 AB Nunhem, Municipality of Leudal, The Netherlands.

It is NUNHEMS' mission to deliver the best products to our customers. For this reason, NUNHEMS protects the results of its breeding and research activities by intellectual property rights, including Patent and Plant Variety Protection.

In conjunction with this policy, NUNHEMS has filed Utility Patent applications, listed under U.S. Patent application numbers and issued patent numbers in Annex A.

The protection of U.S. Patents and applications covers all the material and information described in the claims (as can be found on http://patft.uspto.gov/).

I. Patents and Patent Applications on Plant Traits and Methods

Publication # PCT	Publication # US	Title	Varieties Containing Trait
WO2009059777	US8710303 B2 (US2011047642)	New cucumber plants with a compact growing habit	Hi Jack; Hi Power; Hi Tona; Hi Lisa; Hi Land; Hi Force; Ad Raise F1
WO2009092560	US8816155 B2 (US2011041217); US8704045 B2 (US2012045565); (US2010319081); US9986700 B2	Onions with high storage ability, high soluble solids content and/or low pungency	S7210 (⁺Sunions™)
WO2010142465	US9532520 (B2) (US2012084881) (US2015156978)	Drought tolerant plants	
WO2012069539	US10517249 B2 US9763399 B2 (US2013152223) (US2014020139)	Dual Purpose Pollenizer Watermelons	
WO2013120781	US10433512 B2 US10582683 B2 (US20170156278) (US2015040265)	Triploid watermelon plants with a *bush* growth habit	
WO2013127988	US9603319B2 (US2015216137)	TSWV resistant Capsicum plants	
WO2013135726	US9551008 B2 (US2015047067)	Tomato plants with intense phenotype and TYLCV resistance	NUN 03484 TOF (NUN 03484); NUN 03485 TOF (NUN 03485)
WO2014049002	US9622430 B2 (US20150237816)	Solanum lycopersicum plants having non-transgenic alterations in the ACS 4 gene	
WO2014079896	US9832943 B2 (US2015282446)	Solanum lycopersicum plants having non-transgenic alterations in the ACS 2 gene	
WO2014090968	US10034441 B2 (US2015313107)	Melon plants with Melon Yellowing associated Virus (MYaV) resistance	
WO2014118150	US9901047 B2 (US2015366152)	Solanum lycopersicum plants having pink fruits	
WO2015036469	US2019185878 A1 US10258002 B2	Spinach plants that are resistant to downy mildew (RPF12 gene)	Cepheus; Pegasum; Serpens; Canopus;

Publication # PCT	Publication # US	Title	Varieties Containing Trait
	(US2016177330) (US2017027127)		Regor, Cursa
EP2848114	US9624507 B2 US10258001 B2 (US2017027126)	Spinach plants that are resistant to downy mildew (RPF11 gene)	Hydrus; Volans; Canopus, Virgo, Antalia, Canopus, Scultptur, Eridanus, Nembus
WO2015040098	US2019014732 A1 US10212898 B2 (US2016205886)	Plants with an intense fruit phenotype	
WO2015185475	US10334797 B2 (US2018146633)	Melon plants with a dominant Melon Yellowing Associated Virus (MYAV) resistance gene	
WO2015177206	US10362742 B2 (US2017202168)	Melon plants with Whitefly Resistance	
WO2015136085	US10440914B2 (US2016374303)	Bremia lactucae Resistant Plants*	
WO2008119618	US9364014B2 (US2010104728)	Process of Producing Tomato Paste	
WO2016059090	US10306851 B2 (US2017238493)	Yield QTLs in Cucumber Plants	
WO2016059092	US10306850 B2 (US2017238492)	Yield QTLs in Cucumber Plants	
WO2016066748	US2017318770 A1	Lettuce Plants Comprising Resistance against Nasonovia ribisnigri Biotype 1	
WO2016113329	US2018049384 A1	Citrullus lanatus producing fruits with high texture fruit flesh	
WO2016177696	US2018288960 A1	Introgression of a Yield QTL in Cucumis sativus Plants	
WO2017012951	US2018208628 A1	New species of Tobamovirus	
WO2017060350	US2018310514 A1	Watermelon Plants with Cucumber Vein Yellowing Virus (CVYV) Resistance	
WO2017178520	US2019110426 A1	Introgression of Two Yields QTL in Cucumis sativus Plants	
WO2017202715	US2019194672 A1	Seedless Fruit Producing Plants	
WO2018011075		ToLCNDV Resistant Melon Plants	Coliseo
WO2018060444		Parthenocarpic Watermelon Plants	

Publication # PCT	Publication # US	Title	Varieties Containing Trait
WO2018193044		TOLCNDV Resistant Melon Plants	
WO2019068647		CGMMV Resistant Citrullus Plants	
WO2019068647		Complete Resistance to Downy Mildew in Basil	
WO2019145446		Spinach Plants Resistant to at least Peronospora farinosa Races 8 and 10 to 16	
WO2019145447		Spinach Plants Resistant to at least Peronospora farinosa Races 8, 9, 11, 13, and 16 a	

II. Utility Patents and Utility Patent Applications on Varieties

Application Title	Commercial name of variety	Publication Number	US Patent Number
Artichoke			
Hybrid Artichoke variety NUN 4060 AR	Sambo	US2012/0227122	8,669,420
Hybrid Artichoke variety NUN 04325 AR	Green Queen	US2014/0053292	9,398,748
Artichoke variety NUN 04455 AR	Green Triumph	US2018/0070546	10,212,909
Carrot			
Hybrid carrot variety PURPLE ELITE	Purple Elite	US2013/0305401	9,000,266
Hybrid carrot variety PURPLE SNAX	Purple Snax	US2013/0305403	9,012,724
Hybrid carrot variety Rebel	Rebel	US2013/0305402	8,952,220
Hybrid carrot variety TROOPER	Trooper	US2013/0239242	9,131,650
Hybrid carrot variety SLENDERCUT	Slendercut	US2013/0247241	9,012,725
Hybrid carrot variety NUN 89141 CAC	Snow Man	US2013/0305404	8,962,923
Hybrid carrot variety NUN 85180 CAC	Hoss	US2013/0263305	9,480,211
Hybrid carrot variety NUN 85190	Bulldog	US2014/0173772	9,060,476
Hybrid carrot variety NUN 85021 CAC	Eaglepak	US2014/0182007	9,006,516
Hybrid carrot variety NUN 85931 CAC	NUN 85931 CAC	US2014/0245473	9,107,356
Hybrid carrot variety NUN 89849 CAC	Rubyqueen	US2015/0201573	9,480,212
Hybrid carrot variety NUN 85933 CAC	Highcut	US2017/0142921	10,327,403
Carrot Variety NUN 85192 CAC		US2019/0174698	
Carrot Variety NUN 85936 CAC		US2019/0174699	
Carrot Variety NUN 89853 CAC		US2019/0183083	
Carrot Variety NUN 85935 CAC		US2019/0313592	
Cucumber			
Cucumber variety NUN 5545 CUP	Logan	US2013/0074203	9,234,207
Cucumber variety NUN 52007 CUP	Tacana	US2015/0181825	10,201,145

Application Title	Commercial name of variety	Publication Number	US Patent Number
Cucumber variety NUN 55513 CUP	Prolix	US2015/0181826	10,172,315
Cucumber variety NUN 53016 CUP	V 5016	US2015/0181827	10,172,316
Cucumber variety NUN 43003 CUL	Sepire	US2016/0007550	10,098,311
Cucumber variety NUN 53019 CUP		US2016/0021840	10,064,352
Cucumber variety NUN 53025 CUP	V 5025	US2017/0086403	10,264,753
Cucumber variety NUN 53031 CUP	V 5031	US2017/0079231	10,271,504
Cucumber variety NUN 55516 CUP		US2018/0077889	10,492,409
Cucumber variety NUN 52010 CUP		US2018/0184605	10,448,592
Cucumber variety NUN 52011 CUP	V 5211	US2018/0184609	10,455,785
Cucumber variety NUN 51024 CUP	Proscore	US2018/0368350	
Leek			
Leek variety Nun 08412	Nunton	US2013/0202775	9,179,637
Leek variety NUN 10401 LEL	Chiefton	US2017/0332596	10,219,465
Leek variety NUN 50215 LEL	Shafton	US2018/0184611	10,206,354
Lettuce			
Lettuce variety Intred	Intred	US2012/0137383	8,754,293
Lettuce variety NUN 09050 LTL	Multigreen 50	US2014/0289883	9,380,756
Lettuce variety NUN 09055 LTL	Multired 55	US2012/0144517	8,796,512
Lettuce variety Multigreen 60	Multigreen 60	US2013/0145504	9,144,223
Lettuce variety Multigreen 57 LTL	Multigreen 57	US2013/0219544	9,198,395
Lettuce variety NUN 06075 LTL	Luminous	US2013/0247244	9,198,396
Lettuce variety NUN 06109 LTL	Copious	US2015/0313171	9,999,197
Lettuce variety NUN 09070 LTL	Skrunch Red 70	US2015/0320004	9,426,965
Lettuce variety NUN 06117 LTL	Vicious	US2016/0295826	9,913,452
Lettuce variety NUN 09085 LTL	Greenflash	US2016/0316709	9,756,829
Lettuce variety NUN 06773 LTL	Themes	US2017/0359993	10,334,806
Lettuce variety NUN 09102 LTL	Skrunch 102	US2018/0255742	10,575,484
Lettuce variety NUN 09131 LTL	Elemental	US2018/0255722	10,561,092
Lettuce variety NUN 05379 LTL	Batigol	US2018/0255740	10,561,093
Lettuce variety NUN 00162 LTL	Nupic	US2018/0255741	10,595,487
Lettuce variety NUN 09094 LTL	Thorflash	US2018/0288959	
Lettuce variety NUN 09127 LTL	Bravaflash	US2018/0359979	
Lettuce variety NUN 07839 LTL	Tearflash	US2019/0274271	
Lettuce variety NUN 09117 LTL	Skrunch 117	US2019/0037794	
Lettuce variety NUN 6040 LT	Coraton	US2019/0110424	
Lettuce variety NUN 06193 LTL	Technova	US2019/0223400	
Lettuce variety NUN 09111 LTL	Multigreen 111	US2020/0077609	
Lettuce variety NUN 09148 LTL		US2020/0077610	
Lettuce variety NUN 01201 LTL		US2020/0068830	
Lettuce variety NUN 06147 LTL	Momentous	US2020/0068832	
Lettuce variety NUN 06132 LTL		US2020/0068831	
Melon			

Application Title	Commercial name of variety	Publication Number	US Patent Number
Melon variety NUN 1101 ME	Sunny Dee	US2012/0311731	8,742,209
Melon variety NUN 26181 MEM	Sense 181	US2014/0123333	9,210,849
Melon variety NUN 26191 MEM	Sense 191	US2014/0109252	9,185,859
Melon variety NUN 35007 MEM	Crispy Pear	US2015/0143572	9,516,826
Melon variety NUN 21267 MEM	Silverock	US2015/0156980	9,516,827
Melon variety NUN 26357 MEM	Sweet East	US2015/0156981	9,516,828
Melon variety NUN 26147 MEM	Durawest	US2016/0073603	9,844,194
Melon variety NUN 16121 MEM	Zielo	US2016/0157451	9,867,342
Melon variety NUN 31017 MEM	Silverball	US2017/0042107	10,154,631
Melon variety NUN 71504 MEM	Crispy frost	US2017/0064917	9,980,447
Melon variety NUN 22521 MEM	Sunglow	US2017/0105375	9,980,449
Melon variety NUN 16215 MEM	Zentauro	US2018/0077890	10,334.798
Melon variety NUN 68106 MEM	Coliseo	US2018/0206444	10,463,006
Melon variety NUN 12105 MEM	Sunpeek	US2019/0104701	
Melon variety NUN 16227 MEM	Zendero	US2019/0320608	
Melon variety NUN 16108 MEM	Sense 108	US2019/0297817	
Melon variety NUN 75015 MEM	Crispy Dream	US2019/0327924	
Melon variety NUN 76267 MEM	Mokaya	US2020/0077612	
Melon variety NUN 76307 MEM	Tanager	US2020/0077613	
Melon variety NUN 76207 MEM	Turan	US2020/0077611	
Onion			
Onion variety NUN 03010 ON	Sofire	US2013/0180002	9,516,851
Onion variety DULCIANA	Dulciana	US2014/0007274	9,591,816
Onion variety NUN 2002 ON	NUN 2002 ON	US2015/0319948	9,578,821
Onion variety NUN 08003 ON	Rhea	US2016/073604	9,516,825
Onion variety NUN 17210 ONL	S7210 (+Sunions™)	US2016/0128290	9,986,700
Onions of variety I37853B, I37554A, I37554B, and progeny thereof with high storage ability, high soluble solids content and/or low pungency	NUN 17210 ONL	US2011/0041217	8,816,155
Onion variety NUN 07206 ON	Airoso	US2017/0142922	
Pepper			
Pepper variety NUN 70048 PPH	Aviator	US2018/0160640	
Pepper variety NUN 89004 PPS	Summak	US2019/0320609	
Pepper variety NUN 89006 PPS	Tapuni	US2019/0082647	
Pepper variety NUN 89007 PPS	Katzi	US2019/0327927	
Spinach			
Hybrid spinach variety ANDROMEDA	Andromeda	US2012/0222147	8,563,807
Spinach variety NUN 05004 SPS	Alcor	US2018/0098518	10,349,593
Spinach variety NUN 06258 SPS	Crater	US2019/0230880	
Spinach variety NUN 05048 SPS	Minkar	US2018/0317416	10,383,300
Spinach variety NUN 06202 SPS	Tabit	US2018/0317417	10,463,001

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Yours sincerely,

Nunhems B.V.

Rob Huijten
Head of Legal & Industry Affairs

Annex: 1