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An Innovation Garden for Farmers' Plant Breeding? Inspiration from the Regulatory Sandbox

While farmers continue to engage in plant breeding, contemporary plant innovation laws – namely patent law and plant variety protection (PVP) – increasingly limit their freedom to operate. Patents on plant-related inventions can restrict access to breeding material in the absence of a full breeders' exemption. Furthermore, the breeders' exemption under PVP law still involves legal uncertainty because newly developed varieties may risk infringing the rights of the initial PVP holder. Combined with other laws governing the circulation of seeds – such as seed marketing legislation and plant health regulations – these frameworks can create difficulties for farmers' breeding projects.

Focusing specifically on intellectual property (IP) law, this article proposes the concept of an Innovation Garden, inspired by the regulatory sandbox. The Innovation Garden would provide farmer-breeders with a legally secure space for plant breeding through the necessary tailoring of regulatory requirements. It would also enhance legal certainty by offering guidance on potential infringement and compliance risks. By examining the challenges and possible mitigating measures, the article argues that such a regime is legally feasible and capable of supporting farmers' innovation.

I. Background

For millennia, plant breeding was inseparable from farming. Farmers themselves were the first plant breeders, developing and maintaining crop diversity over generations. Only with the emergence of the science of plant breeding has breeding become industrialised. This shift brought with it a series of laws that turned seed circulation into a regulated domain. Seed saving and exchanging, which were once free and unrestricted activity, increasingly became subject to legal regulation. As a result, the prevalent laws treat farmers primarily as recipients of seeds produced externally by industry. In fact, law and technology have been used to ensure repeated purchase of seeds by farmers ever since the emergence of scientific plant breeding.¹

Both intellectual property (IP) and seed marketing laws are central to the shift in how farmers came to be positioned as recipients of seeds. In practice, IP laws – namely patent law, and plant variety protection (PVP) laws – do not treat farmers as breeders because their breeding often happens in a collective manner and a community of farmers cannot be recognised as the breeder of a new plant

variety.² The PVP regime providing plant breeders' rights draws a line between breeders and farmers and standardises the characteristics of varieties eligible for protection. As a result, farmers' varieties, which are often heterogeneous in nature, often fail to meet the criteria required for PVP protection or for access to seed market, both of which rely on standards of Distinctness, Uniformity, and Stability (DUS).

Initially developed in industrialised countries, intellectual property protection for plants spread globally through Art. 27(3)(b) of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization. The impact of IP laws on farmers' right to save seeds and farmers' seed system has been widely criticised.³ Scholars have raised concerns about the asymmetry between the

² Although a community may be the title holder of plant variety rights, it cannot be the breeder of a new plant variety. For discussion Jay Sanderson, *Plants, People and Practices* (CUP 2017) 105.

³ Thomas Braunschweig and others, 'Owning Seeds, Accessing Food: A Human Rights Impact Assessment of UPOV 1991 Based on Case Studies in Kenya, Peru And the Philippines' (The Berne Declaration Zurich 2014); Anja Christinck and Morten W Tvedt, 'The UPOV Convention, Farmers Rights and Human Rights: An Integrated Assessment of Potentially Conflicting Legal Frameworks' (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) 2015) 63; Olivier De Schutter, Report of the Special Rapporteur on the Right to Food (UN A/64/170 2009) para 40; Hans Morten Haugen, *The Right to Food and the TRIPS Agreement: With a Particular Emphasis on Developing Countries' Measures for Food Production and Distribution* (Martinus Nijhoff Publishers 2007).

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¹ Michael Blakeney, *Intellectual Property Rights and Food Security* (CABI 2009).

extensive monopoly rights granted over plant genetic resources and the limited recognition of farmers' rights to seeds.⁴ Studies have shown that strong intellectual property rights (IPR) in plant varieties can undermine farmers' access to seeds and right to food.⁵ While failing to deliver the promised benefits to developing countries, IP protection has, in some instances, facilitated the misappropriation of local and farmers' varieties by enabling private actors to obtain exclusive rights over farmers' varieties.⁶

The role of farmers in plant breeding did not receive adequate attention (even from the international scientific community and civil society organisations) till the 1980s, and farmers were regarded as just seed users and savers.⁷ Their role as plant breeders who continue to breed new varieties was highlighted by farmers' organisations through the seed sovereignty movement by the 1990s.⁸ Seeds being one of the highly regulated resources, engagement in plant breeding entails finding a way through a series of regulations.⁹ If farmers intend to be involved in plant breeding, they must navigate the complex web of legal standards which guide the whole process from accessing breeding material to gaining market access. The European model of compulsory seed certification and variety registration systems, which most of the developing countries have adopted, permits the marketing of only registered and certified seeds, often excluding farmers' varieties which do not easily meet those criteria.¹⁰ Furthermore, seeds are also the concern of conservation measures and risk prevention.¹¹ Conservation policy seeks to ensure the conservation and sustainable use of seeds and genetic resources, whereas risk-prevention policy treats seeds as potential vectors of hazard to human health, the environment, and the economy, particularly through the spread of pests and diseases. This subjects

them to regulatory measures such as plant health legislation. Taken together, these measures mean that engaging in plant breeding requires navigating a complex regulatory landscape encompassing patent law, plant variety protection, seed marketing, plant health, and international access and benefit-sharing regimes for professional breeders and farmers alike.

Despite the legal complexity of the regulatory landscape, farmers have still been engaging in plant breeding. Over the past few decades there has been growing recognition of farmers' varieties, with some countries providing legal pathways for the registration of such varieties, thereby enabling their marketing.¹² The EU has also developed some derogations from its strict seed marketing laws, for instance as conservation variety, or organic heterogeneous material (OHM), which could possibly be used by farmers to market their varieties.¹³ The new proposal on seed marketing regulation even includes 'locally newly bred' varieties under the definition of conservation variety.¹⁴ Whether it be opening spaces for landraces or newly bred population, or even conventional DUS varieties, there are instances where farmers have successfully registered variety. For instance, in Vietnam, farmers have organised themselves in self-managed seed clubs to produce and supply seeds, where they successfully produced around 360 rice varieties. They produce good quality seeds characterised by high seed purity, high germination rates, uniformity in growth, and higher yield leading to the successful registration of some varieties.¹⁵

Farmers treat all available materials as resources for further improvement.¹⁶ Therefore, farmers' breeding practices exist along a spectrum ranging from the use of farmers' own varieties or landraces, to breeding with PVP protected varieties, and even patented genetically modified varieties.¹⁷ Farmer-breeders face considerable challenges in accessing plant varieties, including those in the public domain, due to restrictions arising from seed marketing laws, plant health regulations, and

⁴ Keith Aoki, 'Seeds of Dispute: Intellectual-Property Rights and Agricultural Biodiversity' [2009] *Golden Gate University Environmental Law Journal* 79; Cary Fowler, 'The Plant Patent Act of 1930: A Sociological History of Its Creation' (2000) 82 *Journal of the Patent and Trademark Office Society* 621; Jack R Kloppenburg (ed), *Seeds and Sovereignty: The Use and Control of Plant Genetic Resources* (Duke University Press 1988).

⁵ Braunschweig and others (n 3).

⁶ One example concerns the farmers' onion variety Violet de Galmi from the Ader region of Niger. In 2006, a private seed company stabilised this traditional variety and applied for plant variety protection. Following a formal objection by the Government of Niger, the African Intellectual Property Organization (OAPI) refused the application under the original denomination. The variety was subsequently renamed Violet de Damani and granted plant variety protection in 2015. See Mohamed Coulibaly and others, *A Dysfunctional Plant Variety Protection System: Ten Years of UPOV Implementation in Francophone Africa* (APBRES 2019) 27-30; Isabel Lopez Noriega, 'Defensive Protection of Farmers' Varieties' in Michael Halewood (ed), *Farmers' Crop Varieties and Farmers' Rights: Challenges in Taxonomy and Law* (Routledge 2016).

⁷ Pat Mooney, 'Commentary: Recommendations: A Way Forward For Agricultural Biodiversity' in Global Alliance for the Future of Food, *The Future of Food: Seeds of Resilience – A Compendium of Perspectives on Agricultural Biodiversity From Around The World* (2016) 103.

⁸ *ibid.*

⁹ Niels Louwaars and Bram De Jonge, 'Regulating Seeds – A Challenging Task' (2021) 11 *Agronomy* 2324.

¹⁰ Niels Louwaars and François Burgaud, 'Variety Registration: The Evolution of Registration Systems with a Special Emphasis on Agrobiodiversity Conservation' in Halewood (n 6) 193-95.

¹¹ Louwaars and De Jonge (n 9).

¹² Bram De Jonge and others, 'Advances in the Registration of Farmers' Varieties: Four Cases from the Global South' (2021) 11 *Agronomy* 2282.

¹³ The conservation varieties regime allows the landraces and varieties which are naturally adapted to local and regional conditions and threatened by genetic erosion to be included in the national catalogues of varieties of agricultural plant species (Directive 2008/62/EC, [art 1(1)(a)]; EU Organic Regulation 2018/848; Also see Fulya Batur, Riccardo Bocci and Béla Barthá, 'Marketing Farmers' Varieties in Europe: Encouraging Pathways with Missing Links for the Recognition and Support of Farmer Seed Systems' [2021] 11 *Agronomy* 2159.

¹⁴ Proposal for a Regulation of the European Parliament and of the Council on the production and marketing of plant reproductive material in the Union (2023/0227 COD), art 3 (29).

¹⁵ Seed clubs have so far produced 360 farmer-developed rice seed varieties, of which five are already certified and four others are going through various stages in the registration and certification process. Huynh Quang Tin and others, *Securing the Local Seed Systems: The Journey of Farmers' Seed Clubs in Vietnam* (SEARICE 2019) 10.

¹⁶ Rene Salazar, Niels P Louwaars and Bert Visser, 'Protecting Farmers' New Varieties: New Approaches to Rights on Collective Innovations in Plant Genetic Resources' (2007) 35 *World Development* 1515, 1520.

¹⁷ See Saurav Ghimire and Christine Frison, 'Accommodating Farmers-Breeders' Access To Breeding Materials In IP and ABS Regime For Inclusive Innovation' in Amandine Leonard, Arina Gorbatyuk and Esther Van Zimmeren (eds), *The Future of IP: Stimulating Creativity and Inclusivity, Liber Amicorum Geertrui Van Overwalle* (Intersentia 2025).

international access regimes. Although certain breeding materials are publicly available, access is often restricted in practice. This is because seed marketing legislation may prohibit seed exchange, while plant health requirements and international access rules can further impede access of breeding material by restricting movement of breeding materials.

To address the regulatory constraints for farmers' access to breeding material due to different laws regulating seeds, and to support them in plant breeding, this article proposes the concept of an Innovation Garden, an experimental legal regime based on regulatory sandboxes. The analysis in this article focuses on IP law because, unlike other regulatory regimes governing seeds, it concerns property rights and therefore warrants specific attention. The article explores the legal possibility of such a sandbox regime within existing regulatory systems rather than prescribing detailed implementation rules. The discussion is not confined to any particular jurisdiction, instead, it proposes the concept of an Innovation Garden that can be adapted and customised within diverse national legal systems. Section II analyses how IP law constrains farmers' breeding activities and limits their freedom to operate. Section III advances the proposal of Innovation Garden, an experimental legal regime designed to support farmers' breeding, and argues that such a framework could be developed within the existing laws. Section IV concludes with final reflections.

II. Shrinking space for farmer-breeders

Intellectual property has become an unavoidable force, even finding its way into international legal instruments such as the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), whose primary objectives concern the conservation and sustainable use of biodiversity. While TRIPS permits members to exclude 'plants' from patentability, it simultaneously requires them to provide legal protection for 'plant varieties' either through patents, an effective sui generis system, or a combination of both (Art. 27(3)(b)). Even Least Developed Countries (LDCs) are required to comply with this obligation by 1 July 2034, signalling the universal reach of IPR norms in the field of plant innovation.¹⁸

Approximately 60% of the 126 countries in the Global South permit the patenting of plants or parts thereof.¹⁹ In about 43% of these countries (those that follow the European model) plant varieties and biological processes for obtaining them are excluded from patentability. However, the law in these jurisdictions still allows patents on genetic material, plant parts such as cells and DNA sequences, and biotechnological processes used to produce plants.²⁰ As a result, a patent holder's rights can extend to the further use of a whole plant, any plant variety

containing the patented component, or any variety developed through a patented process. Consequently, patent holders can control the production and commercialisation of such plant varieties and their derivatives, even though the varieties themselves are not patentable per se.²¹ Moreover, even where plants are formally excluded from patentability, patent office and court interpretations have in practice enabled the granting of patents, for example on isolated genes in India and on methods for producing transgenic plants in Brazil.²² The proliferation of patents on plant-related innovations is limiting third parties' ability to access and use breeding materials because breeder's exemptions – which allow use of protected variety for further breeding – are absent from most patent regimes, and narrowly defined where they exist.²³ Some countries have introduced a breeder's exemption into patent law to facilitate access to breeding materials. For instance, Germany, France, Switzerland, and the Netherlands allow limited use of patented material for breeding, but not for commercialisation of resulting varieties.²⁴ While a step forward, these narrow exemptions do little to support the breeding practices of farmers.

An example of a patent on tomatoes resistant to the tomato brown rugose fruit virus (ToBRFV) is worth mentioning in this context. In 2024, the European Patent Office granted two patents on conventionally bred, non-GM tomatoes resistant to ToBRFV. These patents claim exclusive rights over tomato plants with ToBRFV tolerance/resistance, as well as breeding processes using naturally occurring gene variants for plant selection.²⁵ Patent claims can extend to different varieties of tomatoes that might have patented resistance and creating legal uncertainty. A participatory breeding project of farmers in Germany who are breeding tomatoes on their organic farm is threatened by patents on tomatoes including the ones on ToBRFV.²⁶ Another illustrative case is that of smallholder farmers in the Philippines, who deliberately incorporated a genetically modified (GM), patent-protected trait into widely cultivated open-pollinated maize varieties, thereby creating several distinct new varieties.²⁷ This has led to the widespread dissemination of

²¹ *ibid.*

²² *ibid.*; see Bram De Jonge, Rene Salazar and Bert Visser, 'How Regulatory Issues Surrounding New Breeding Technologies Can Impact Smallholder Farmer Breeding: A Case Study from the Philippines' (2022) 4 *Plants, People, Planet* 96-105.

²³ See Viola Pifti, *The Breeder's Exception to Patent Rights* (Springer 2015).

²⁴ Geertrui Van Overwalle, 'Rethinking IP Protection for Plants? Revisiting the Exclusivity-Access Balance Through the Type-Token Ontology' in Rafal Sikorski and Zaneta Zemla-Pacud (eds), *Patents as an Incentive for Innovation* (Kluwer Law International 2021) 158.

²⁵ EP3629711B1, Date of Grant 28 August 2024; EP3735125B1, Date of Grant 23 October 2024; Patent thicket has built up around the genetic resources needed to breed plants with resistance as more than 20 international patent applications filed by ten different companies. See No patent on Seeds, 'Tomato (Jordan virus)' <https://www.no-patents-on-seeds.org/en/jordan_virus> accessed 15 August 2025.

²⁶ Statement of Dagmar Urban from Arche Noah, in Online Roundtable: Free Access to Seeds – for a crisis-proof food system, 9 December 2024 organised by Greens/EFA/S&D/The Left in the European Parliament, recording available at <https://www.youtube.com/watch?v=GSc-jnzjl_s&ab_channel=MartinH%C3%A4usling> accessed 15 August 2025.

²⁷ See De Jonge, Salazar and Visser (n 22).

¹⁸ Council for TRIPS, 'Extension of the Transition Period under Article 66.1 for Least Developed Country Members' (IP/C/88, 29 June 2021).

¹⁹ Carlos M Correa, Juan I Correa, and Bram De Jonge, 'The Status of Patenting Plants in the Global South' (2020) 23 *The Journal of World Intellectual Property* 121-46.

²⁰ *ibid.*

glyphosate-tolerant open-pollinated farmers' varieties. Farmers breeding with GM varieties is a complex issue involving biosafety considerations which goes beyond the scope of this article. Nevertheless, it is important to note that farmers possess both the capacity and the willingness to develop new varieties and there is a need for an appropriate legal framework to address and regulate these efforts.

As new genomic techniques (NGTs) become more prevalent, legal uncertainty is likely to increase because a patentable gene-edited plant can be phenotypically and genotypically indistinguishable from a naturally occurring mutant plant or a plant obtained through conventional breeding.²⁸ Thus, farmers and conventional breeders are likely to be pulled into patent infringement disputes if they develop and market a new plant variety whose main traits look similar to those of a patented gene-edited plant due to congruent mutations.²⁹ Given that most national patent laws allow for the patenting of NGTs and the plants or plant genetic material developed from them, the number of such patents is expected to rise.³⁰ Similarly, a related source of uncertainty concerns the scope of patent claims covering general enabling methods. Unlike methods that lead to a specific characteristic – such as a trait tied to an identifiable mutation, where farmers may be able to identify the relevant patent – with enabling technologies it is impossible to tell from the plant which technologies have been used in its development.³¹ As a result, it becomes difficult to determine whether the seed is affected by the patent (unlike when the patent is on trait). Some jurisdictions have favoured a broad interpretation creating legal uncertainty as neither breeders nor farmers would have a way to identify which general enabling technology patent may affect a seed product.³²

Similarly, an increasing number of countries are adopting plant variety protection (PVP) regimes, as reflected in the growing membership of the International Union for the Protection of New Varieties of Plants (UPOV). Out of the 80 UPOV members, 61 are parties to the 1991 Act of the Convention, which provides stronger protection for breeders.³³ Some countries – for instance Indonesia – have enacted plant variety protection legislation closely aligned with the standards of the UPOV 1991 Act even though they are not members of UPOV. The UPOV-based PVP right grants breeders exclusive rights over their plant varieties, provided these are distinct, uniform, stable, and (commercially) novel.³⁴ The

title holder has a right to produce and commercialise reproductive material of the protected variety exclusively. However, unlike patents, PVP law has an inherent breeders' exemption that ensures access to protected varieties for further breeding and commercialisation.³⁵ The right holder cannot prevent others from using the protected variety to develop new ones. Furthermore, countries may choose to provide a farmers' exemption, which permits the use of farm-saved seeds from protected varieties for planting on the farmer's own holding.³⁶ Ideally, farmers should also be permitted to breed plants using PVP-protected varieties. The explanatory note adopted by the UPOV Council clarifies that the UPOV Convention imposes no restrictions regarding the methods or techniques used to breed a new variety, nor does it restrict who can become a breeder.³⁷ However, there are both legal and practical difficulties in farmers' exercise of breeders' exemption.

While the breeders' exemption allows the use of a protected variety for further breeding, the resulting variety must be sufficiently different from the protected variety. This is because the right of PVP right as per UPOV 1991 covers: (i) the varieties that cannot be clearly distinguished from the protected variety, and also (ii) the varieties that are 'Essentially Derived Varieties (EDV)'.³⁸ EDVs are the first-or-second-generation derivatives of the protected varieties.³⁹ An EDV is predominantly derived from an initial variety, remains clearly distinguishable, yet continues to express the essential characteristics resulting from the genotype or combination of genotypes of the initial variety, except for differences arising from the act of derivation (UPOV 1991, Art. 14(5)(b)). The EDV concept was introduced to prevent plagiarism – that is, to discourage the deliberate creation of close imitations of existing plant varieties.⁴⁰ However, the legal uncertainty surrounding EDVs is such that, for both the holder of the initial variety and the breeder of the derived variety, clarity can typically only be achieved through litigation, thus creating a deterrent effect against pursuing breeding programmes that might result in an EDV.⁴¹

The degree of similarity between the protected variety with other varieties and the issue of EDVs remain concerns for the farmers. There could be situations where material used by farmers is quite similar to a protected variety, for instance, traditional varieties might be similar to a

28 Hans-Georg Dederer, 'Patentability of Genome-Edited Plants: A Convoluted Debate' (2020) 51(6) IIC 681–84.

29 De Jonge, Salazar and Visser (n 22) 99.

30 Daria Kim and others, 'New Genomic Techniques and Intellectual Property Law: Challenges and Solutions for the Plant Breeding Sector' (2023) Max Planck Institute for Innovation & Competition Research Paper No 23-16.

31 Michael Andreas Kock, *Intellectual Property Protection for Plant Related Innovation* (Springer International Publishing 2022) 283.

32 *ibid.*

33 See <https://www.upov.int/edocs/pubdocs/en/upov_pub_423.pdf> accessed 7 October 2025.

34 UPOV Convention 1991, art 5(1).

35 See Geertrui Van Overwalle, 'Rethinking IP Protection for Plants? Revisiting the Exclusivity-Access Balance Through the Type-Token Ontology' in Rafal Sikorski and Zaneta Zemla-Pacud (eds), *Patents as an Incentive for Innovation* (Kluwer Law International 2021).

36 UPOV Convention 1991, art 51(2).

37 UPOV, 'Explanatory Notes on the Definition of Breeder Under the 1991 Act of the UPOV Convention' (adopted by the Council at its forty-seventh ordinary session on 24 October 2013, UPOV/EXN/BRD/1).

38 UPOV Convention 1991, art 14(5)(a).

39 Srividhya Ragavan and Jamie Mayer O'Shields, 'Has India Addressed Its Farmers' Woes: A Story of Plant Protection Issues' (2007) 20(1) Georgetown International Environmental Law Review 4.

40 International Seed Federation (ISF), 'ISF View on Intellectual Property (adopted in Rio de Janeiro, Brazil, 28 June 2012, amended by ISF on 8 July 2021)' 22 <<https://worldseed.org/wp-content/uploads/2021/10/ISF-View-on-Intellectual-Property-2012-amended-2021.pdf>> accessed 10 December 2025.

41 Kock (n 31) 141.

protected variety.⁴² Or, when farmers engage in deliberate breeding their resulting variety may fall under EDV or may not be sufficiently different from the protected variety.⁴³ The holder of the PVR for the initial variety may claim exclusive right if the result of subsequent breeding is not sufficiently distinct from the initial variety or qualifies as an EDV. Therefore, difficulties arise when varieties used by farmers cannot be distinguished clearly enough from protected varieties.⁴⁴ With patents the question of infringement is determined by accessing similarities between the claimed subject matter and the process or product applied by the accused. In the case of PVP, however, this becomes a question of whether the characteristics that define a protected variety are present in the varieties used by farmers. While some authorities use genetic distance metrics as decision aids, there is no accepted threshold in UPOV.⁴⁵ These threshold values are not statistical questions, rather they are subjective value judgements.⁴⁶ The concept of EDV can, in practice, constrain farmers' freedom to use protected varieties for further breeding.⁴⁷ This issue is acute in crops with narrow genetic bases such as soybean and lettuce, where unrelated varieties may show very high similarity.⁴⁸

If farmers become entangled in infringement claims, rebutting such claims may not always be straightforward. For instance, a maize farmer was sued by a seed company for allegedly pirating its seed. However, a genetic test in the laboratory of the Indonesian Centre for Biodiversity and Biotechnology proved that his seeds were genetically different. Nevertheless, the farmer was imprisoned for ten months for trading in uncertified seeds under seed certification laws.⁴⁹ While the law does not prevent farmers

from becoming involved in breeding, their engagement in it could still face a chilling effect due to legal uncertainty and possible lawsuits. Field study conducted in Indonesia indicates that the combined impact of the PVP law, seed certification requirements and a series of lawsuits against farmers, along with frequent surveillance by companies and law enforcement officials, has indeed resulted in a chilling effect.⁵⁰ As a result, farmers are increasingly hesitant to exercise even their legitimate rights to engage in plant breeding.⁵¹ Similarly, high legal costs and unclear laws can also have a chilling effect on farmers exercising legitimate rights, as noted by a parliamentary inquiry in Western Australia, which found that farmers were discouraged from seeking compensation for economic losses caused by contamination from GM material.⁵²

Furthermore, when it comes to recognition as a breeder for the purpose of registering a PVP right over their variety, a community of farmers could obtain legal personhood to register their variety for protection under PVP law despite the associated challenges.⁵³ However, farmers are unlikely to benefit from the breeders' exemption, as their breeding practices often involve the frequent exchange and sharing of protected materials, which fall outside the scope of activities permitted under the exemption. The exchange of protected seed is treated as an act of commercialisation and is explicitly prohibited under PVP law. While IP laws already create difficulties to save and exchange seeds for farmers, it is unrealistic to assume that farmers can easily exercise the breeders' exemption.

The preceding paragraphs have shown that farmers face difficulties in accessing materials for further improvement. IP in biological materials is a global reality. Countries like India and Brazil no longer contest the morality of patenting life forms in international forums. Rather, their focus has shifted towards ensuring equitable sharing of benefits arising from patents on genetic materials.⁵⁴ There is a pressing need for legal certainty and a tailored framework that shields farmer breeders from infringement risks while safeguarding their access to genetic resources. The following section therefore proposes the concept of an 'Innovation Garden' – an experimental legal regime that provides a

⁴² Anja Christinck and Morton W Tvedt, 'The UPOV Convention, Farmers Rights and Human Rights: An Integrated Assessment of Potentially Conflicting Legal Frameworks' (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) 2015) 64.

⁴³ Ignacio illustrates, through examples from several Asian countries, how farmers develop improved crop varieties via selection, adaptation trials, participatory varietal selection, and evolutionary breeding using materials obtained from research institutions and local varieties. She notes that such farmer-developed varieties could potentially qualify as essentially derived varieties (EDVs), thereby raising concerns about the risk of penalising farmers for their innovations. See Normita Gumasing Ignacio, 'Essentially Derived Varieties and the Perspective of Farmers-Breeders' in 'Seminar on Essentially Derived Varieties' (UPOV, 22 October 2013, Geneva, Switzerland) 35 <https://www.upov.int/edocs/pubdocs/en/upov_pub_358.pdf> accessed 10 December 2025.

⁴⁴ *ibid.*

⁴⁵ For national approaches to the interpretation of EDV See Hamish MacDonald and Seyed Hossein Jamali, 'Intellectual Property Over Mutant and Gene Edited Plants' in Nitish Kumar, *Plant Mutagenesis* (Springer 2024) 43.

⁴⁶ See Vincent Lombard and others, 'Genetic Distance Estimators Based on Molecular Data for Plant Registration and Protection: A Review' (2001) 451 *Acta Horticulturae* 55, 61; Mark D Janis and Stephen Smith, 'Technological Change and the Design of Plant Variety Protection Regimes' (2007) 82 *Chicago-Kent Law Review* 1557, 1599.

⁴⁷ Carlos M Correa, *Plant Variety Protection in Developing Countries: A Tool for Designing a Sui Generis Plant Variety Protection System: An Alternative to UPOV 1991* (APBEBES 2015) 27, 30.

⁴⁸ Kock (n 31) 141, discussing Stephen Smith, 'The Foundations, Continuing Evolution, and Outcomes from the Application of Intellectual Property Protection in Plant Breeding and Agriculture' in Irwin Goldman (ed), *Plant Breeding Reviews* vol 43 (John Wiley & Sons 2020).

⁴⁹ Christoph Antons and others, 'Farmers as Researchers: Government Regulation of Farmers' Local Knowledge in Indonesia' in Michael

Blakeney and Kadambot H M Siddique (eds), *Local Knowledge, Intellectual Property and Agricultural Innovation* (Springer Singapore 2020) 132.

⁵⁰ Saurav Ghimire and others, 'Plant Variety Protection Law and Farmers' Rights to Save, Exchange and Breed Seeds: The Case of Indonesia' (2021) 16 *JILP* 1013.

⁵¹ *ibid.*

⁵² In *Marsh v Baxter* [2014] WASC 187, an organic farm in Western Australia was contaminated with GM canola from a neighbouring farm. The organic farm lost its certification (along with the price premium for organic produce). The organic farmer sued the GM farmer for the damages of A\$ 85,000. He lost the case and appeal, and instead, his legal fees were in the order of A\$ 2,000,000. The Committee observed that the case may have had a chilling effect on the making of claims for GM contamination. See Standing Committee on Environment and Public Affairs, 'Mechanisms for compensation for economic loss to farmers in Western Australia caused by contamination by genetically modified material' (Report 49, 2019) 26.

⁵³ Sanderson (n 2).

⁵⁴ Jagjit Plahe, Nitesh Kukreja and Sunil Ponnampereuma, 'Review of article 27.3(b) and the Patenting of Life Forms: Hitting a BRIC Wall in the WTO?' (2021) 26 *Int Negot* 291.

protected space for farmers to engage in breeding and experimentation, thereby ensuring legal clarity and enabling regulatory learning that can inform future law reform.

III. An Innovation Garden for farmers' innovation?

Accessing breeding materials and placing new varieties on the market requires navigating a complex set of legal regimes, ranging from seed marketing and plant health rules to international access regulations and intellectual property law. These frameworks were not developed with farmers as their primary beneficiaries and therefore do not account for the specificities of farmer-led breeding. Ensuring legal compliance is not always straightforward for farmers, as it often requires legal expertise. However, their continued breeding efforts even with IP-protected varieties, despite the risk of litigation, reflects their eagerness to experiment with new and beneficial materials. Legal certainty is essential to protect farmers from legal risks, secure their access to breeding material, and ensure that their varieties can enter the market, thereby sustaining their breeding efforts. This requires a clear articulation of their rights to access, use, and improve plant genetic resources, alongside recognition of their contributions to plant breeding.

To guarantee legal certainty and to support farmers' plant breeding, I propose the concept of an 'Innovation Garden', a form of experimental legal regime. The idea is inspired by the notion of the 'regulatory sandbox' but intentionally avoids both of its constituent terms, 'regulatory' and 'sandbox,' as they may suggest control and a sandy environment unsuited to productivity (and so be metaphorically inappropriate for the context of plant breeding). Experimental legal regimes typically involve temporary derogations from general rules to allow for the testing of legal and regulatory frameworks.⁵⁵ While regulatory sandboxes are often understood as a subset of experimental legal regimes, scholars have increasingly sought to distinguish between experimental legal regimes and regulatory sandboxes.⁵⁶ Although both function as regulatory instruments designed to stimulate innovation, a defining feature of regulatory sandboxes lies in their aim to foster closer collaboration between regulators and innovators through the provision of regulatory flexibility.⁵⁷ In contrast to traditional top-down command-and-control approaches, regulatory sandboxes seek to reconfigure the regulator-regulated relationship into one characterised by partnership and co-learning.⁵⁸ Simply put, a regulatory sandbox is a legal framework that allows business entities to operate in a safe legal-laboratory environment to experiment with innovative technologies, products, services, or approaches under supervision of the regulator for a specified period of

time.⁵⁹ They serve a preventive function by protecting businesses from potential legal violations.⁶⁰ A secure testing environment for innovation is provided by either temporarily applying an alternative regulatory regime to a group of firms or by offering tailored guidance on regulatory compliance.⁶¹ For instance, in the FinTech sector, firms admitted into a regulatory sandbox may be temporarily permitted to test new financial products without having to fully comply with regulations that might otherwise hinder or prevent such innovation.⁶² The metaphor of a 'regulatory sandbox' similar to 'playing in a sandbox', conveys the idea that businesses experiment with test programmes (toys) to develop innovative products (sandcastles), all under the supervision of regulators (parents).⁶³

In recent years, regulatory sandboxes have been introduced across various countries and regulated sectors, including finance, energy, healthcare, telecommunications, artificial intelligence, and data protection.⁶⁴ The use of regulatory sandboxes across different sectors is closely linked to their inherent flexibility. While sandboxes are designed to promote innovation, it is important to note that each sandbox constitutes a regulatory innovation in itself, capable of being tailored to the specific context in which it operates.⁶⁵ This flexibility allows regulatory sandboxes to accommodate the distinct challenges that arise across different sectors. While sector-specific sandboxes remain the dominant model in the EU, where fintech-style sandboxes have been extended to other regulated sectors, general-purpose sandboxes are emerging (as illustrated by the Italian approach, which is open to multiple sectors).⁶⁶ Across different jurisdictions, regulatory sandboxes have been applied to, or proposed for, a wide range of sectors, including conservation schemes,⁶⁷ sustainability-oriented governance,⁶⁸

⁵⁹ Mateusz Bonca and Jolanta Jabłońska-Bonca, 'Regulatory Sandboxes – Two Perspectives' (2024) 16(3) *Krytyka Prawa. Niezależne Studia Nad Prawem* 304.

⁶⁰ *ibid* 318.

⁶¹ See Ranchordas, 'Experimental Regulations and Regulatory Sandboxes: Law without Order?' (n 55).

⁶² *ibid* 3.

⁶³ Bonca and Jabłońska-Bonca (n 59) 318.

⁶⁴ For eg, the EU incorporated the concept into its 2024 AI Act; *ibid* 305-06.

⁶⁵ Cristie Ford and Quinn Ashkenazy, 'The Legal Innovation Sandbox' (2024) 72 *The American Journal of Comparative Law* 557, 594.

⁶⁶ *Sperimentazione Italia* is a general-purpose regulatory sandbox that operates by requiring applicants to identify the regulatory barriers affecting their proposed innovations and to demonstrate how existing rules impede innovative activity, thereby justifying the need for regulatory simplification. See Ranchordas and Vinci (n 56) 119.

⁶⁷ In the conservation sector, regulatory sandboxes have been proposed as tools to test conservation schemes under controlled conditions, allowing regulators to assess ecological outcomes before broader deployment. See Markellos and others (n 58) 7.

⁶⁸ In the field of sustainability and competition policy, a sustainability-oriented regulatory sandbox has been proposed in Greece to allow undertakings to test initiatives contributing to sustainable development objectives without significantly distorting competition, with a particular focus on supporting small and medium-sized enterprises in highly regulated sectors. Cristina Poncibò and Laura Zoboli, 'The Methodology of Regulatory Sandboxes in the EU: A Preliminary Assessment from a Competition Law Perspective' (2022) TTLF Working Paper No 61 13 <https://law.stanford.edu/wp-content/uploads/2022/06/EU-Law-WP-61_Poncibo%CC%80Zoboli.pdf> accessed 10 December 2025.

⁵⁵ Sofia Ranchordas, 'Experimental Regulations and Regulatory Sandboxes: Law without Order?' (2021) *Law and Method* 2.

⁵⁶ See Sofia Ranchordas and Valeria Vinci, 'Regulatory Sandboxes and Innovation-Friendly Regulation: Between Collaboration and Capture' (2024) 16 *Italian Journal of Public Law* 107.

⁵⁷ *ibid* 115.

⁵⁸ Raphael Markellos and others, 'Worldwide Adoption of Regulatory Sandboxes: Drivers, Constraints and Policies' (2024) University of East Anglia: Centre for competition Policy CCP Working Paper 24-02, 4.

cannabis regulation,⁶⁹ the humanitarian sector,⁷⁰ and legal services,⁷¹ thus illustrating their use in pursuing objectives that extend beyond innovation alone.

More recently, regulatory sandboxes have also been applied to, or proposed for, the food sector. In this context, Molitorisová and Purnhagen argue that well-designed regulatory sandboxes can facilitate the identification of solutions that support sustainability and innovation in food systems, and accordingly propose their use to enable the placing on the market of novel foods within the EU.⁷² In fact, a limited form of regulatory sandboxing for novel foods already exists in the Netherlands.⁷³ Regulatory sandbox debates have also extended into the field of intellectual property, notably with respect to geographical indications. In this regard, Reinhardt suggests that regulatory sandboxes could enable the adaptation of traditional GI-protected practices to new food products – including plant-based or hybrid alternatives – subject to strict conditions and quality standards.⁷⁴

Drawing on the logic of regulatory sandboxes an Innovation Garden for farmers would function as a one-stop legal framework enabling farmer-breeders to experiment with plant varieties beyond the constraints of laws that govern seeds (namely, IP, seed marketing, plant health, and access rules, etc). The Innovation Garden would serve to reduce regulatory uncertainty by providing regulatory oversight and, where appropriate, tailored derogations across the relevant laws. Its purpose would be to offer legal clarity for farmer-breeders when engaging in breeding activities involving diverse plant materials, for instance by facilitating lawful access to plant materials – including local varieties – in situations where plant passport requirements under plant health legislation would otherwise impede experimental breeding. Similarly, when farmer-breeders engage in activities such as seed exchange within networks, the presentation of experimental varieties at seed fairs, or participatory breeding involving third parties, uncertainty may arise as to when such

activities amount to ‘marketing’ under seed marketing legislation. Here, the Innovation Garden would facilitate experimentation while maintaining regulatory oversight. Furthermore, as discussed above, although a breeders’ exemption already exists in PVP law, legal uncertainty persists with respect to the status of resulting varieties in relation to EDVs. In this respect, the Innovation Garden could provide regulatory clarification. Competent authorities could assess, in dialogue with farmer-breeders, whether newly developed varieties meet the threshold of sufficient distinctness or risk qualification as EDVs, thereby offering legal certainty and reducing chilling effects on farmer-led innovation. Over time, it would generate practical experience in the interpretation of EDV as applied to farmer-breeders and could inform the need for targeted legal reform.

The degree of regulatory flexibility afforded would remain a matter of national or regional design choice. The establishment of a tailored Innovation Garden may require only clarification or reinterpretation of certain legal rules, whereas in other areas it may necessitate legislative change to justify the derogation of rules. For instance, as discussed above, PVP law already incorporates a breeder’s exemption, while patent law does not have a comprehensive breeder’s exemption. This article suggests that extending a breeders’ exemption to patent law would enhance the inclusiveness of plant innovation for farmers. Such an extension would, however, raise additional legal complexities, particularly in light of international obligations, and would therefore require careful legal justification. The following section examines the challenges that IP law poses for the operation of an Innovation Garden, before turning to possible mechanisms for mitigating associated risks.

1. IP laws as a challenge for Innovation Garden?

For farmers-breeders, the various regulations governing seeds may appear similar in practice because they all restrict what can and cannot be done with seeds, and shape their circulation and exchange. At a theoretical level, however, important distinctions arise. In particular, IP such as patents and PVP differ from other forms of regulation in that they establish private property rights over seeds and breeding material. However, some scholars propose viewing IP through the lens of regulatory theory, understanding it not merely as a system of private rights but as a regulatory instrument designed to steer innovation and promote public welfare.⁷⁵ Seen in this way, IP is no longer a moral end in itself but a form of ‘government regulation of the marketplace,’ and as such open to reassessment, reform, and narrowing.⁷⁶ Based on liability rules, models like compulsory licences permitting the use of IP-protected subject matter without the consent of the right holder are already in place.⁷⁷

⁶⁹ In the cannabis sector, regulatory sandboxes have been used or proposed to enable the controlled introduction of cannabidiol- and THC-based products. Objectives range from ensuring patient access and regulatory learning to supporting incremental legalisation and market development, as illustrated by the Brazilian and proposed German models. Hana Al Hallaj and Zahraa Barakat, ‘Regulatory Sandboxes as an Innovative Platform for Testing Cannabis Edibles in Germany’ (2025) 7 (article No 14) *Journal of Cannabis Research* 8.

⁷⁰ In the humanitarian sector, sandboxes have been suggested as a means to promote responsible innovation, for instance by testing new digital identification and electronic KYC solutions based on humanitarian registration data. Aaron Martin and Giulia Balestra, ‘Using Regulatory Sandboxes to Support Responsible Innovation in the Humanitarian Sector’ (2019) 10 *Global Policy* 733.

⁷¹ In legal services, regulatory sandboxes have been advanced as a mechanism to foster innovation and improve access to justice by permitting non-traditional providers, including non-lawyers, to offer limited legal services under tailored supervision, as exemplified by the Utah Supreme Court’s sandbox model; Ford and Ashkenazy (n 65).

⁷² Alexandra Molitorisová and Kai Purnhagen, ‘Regulatory Sandboxes for Novel Foods’ (2025) 16 *European Journal of Risk Regulation* 1063, 1072.

⁷³ *ibid.*

⁷⁴ Tilman Reinhardt, ‘Mission to MARS: How Multi-Actor Regulatory Sandboxes (MARS) Could Improve EU Food Law and Strengthen Food Democracy’ (2025) <<https://ssrn.com/abstract=5597472>> accessed 10 December 2025.

⁷⁵ Geertrui Van Overwalle, ‘Regulation Theory and Intellectual Property Law’ in Christine Godt and others (eds), *Boundaries of Information Property* (1st edn, Intersentia 2022).

⁷⁶ Mark A Lemley, ‘Faith-Based Intellectual Property’ (2015) 62 *UCLA Law Review* 1328.

⁷⁷ Ole-Andreas Rognstad, *Property Aspects of Intellectual Property* (1st edn, CUP 2018) 25.

A key question, therefore, is whether the regulators (e.g. PVP offices or patent offices) are competent to make such determinations, given that issues of property rights fall within the jurisdiction of courts. In fact, in relation to EDV, countries such as Australia and India have attempted to mitigate legal uncertainty by empowering their national PVP offices to determine whether or not a variety qualifies as an EDV.⁷⁸ Kock suggests that although the final decision would be made by a court, it should be possible for the PVP office, upon request of an interested breeder, to render a 'declaratory decision' on whether a derived variety is deemed as an EDV.⁷⁹ Since it concerns the scope of rights of the initial variety, the characteristics of the derived variety and its differences from the initial variety are crucial factors, and this determination is best placed in the hands of the PVP offices.⁸⁰ Even in the case of patents, while courts in most countries have exclusive jurisdiction over matters of infringement, patent offices are competent to determine whether a dependent selection invention is inventive or obvious in comparison with the parent patent.⁸¹ Thus, there are legal grounds for a regulatory body empowered to oversee an Innovation Garden to take the decisions necessary for its effective functioning. As the Innovation Garden brings together multiple regulatory regimes into a tailored framework for farmers, some rules may require temporary derogation, while others may need to be applied in a manner that avoids unnecessary barriers and ensures compliance. In the case of PVP, a breeders' exemption already exists, so the Innovation Garden would provide interpretive guidance for farmer-breeders on whether a new variety qualifies as an EDV or is sufficiently distinct to fall outside the scope of the PVP right holder's protection. Over time, it would generate practical experience in the interpretation of EDV as applied to farmers' breeding. Thus, farmers breeding seeds under an Innovation Garden should be shielded from liability, even if a court were subsequently to determine that the resulting variety constitutes an EDV. Such measures could serve as safeguards to protect farmer-breeders and to ensure their continued access to genetic resources for breeding. Such support is necessary because it is not easy for farmers to technically determine if their exercise of breeders' exemption has led to a variety that has escaped the IP of the PVP holder or that is not EDV. If the result of their breeding is an EDV the initial breeder still controls the commercialisation of EDV, and if the PVP law requires paying royalty for breeders' rights, even saving the seeds of this EDV variety would require the payment of royalties.

Countries are developing different mechanisms to protect farmers from the unintended impacts of PVP and patent law. For instance, under the Indian and Australian Plant Variety Protection Acts, a farmer cannot be held liable for infringement if they can demonstrate that they were unaware of the existence of the protected right at the time the infringement occurred.⁸² The proof of

innocence can include matters like the literacy level of the farmer, or the lack of licences written in his local language, etc.⁸³ While these provisions are important for protecting farmers from being drawn into infringement suits, they do not anticipate situations where farmers intentionally use protected varieties for breeding under the breeders' exemption and the difficulties they face. Similarly, countries are also introducing measures to mitigate the adverse effects of patent protection on farmers and to safeguard access to breeding material for breeders, even where such measures might not be strictly consistent with the property aspect of IP. It indicates a growing legislative willingness to ensure that patent law does not unduly restrict access to patented materials. The difficulties posed for farmers by patent regimes are being increasingly recognised across jurisdictions, prompting the introduction of targeted exceptions and adjustments to IP law in pursuit of broader policy objectives. Farmers are permitted to use harvested seeds for further propagation on their own farm without authorisation from the patent holder under the EU Biotech Directive (Art. 11(1)).⁸⁴ Nevertheless, the Directive aligning the scope of farmers' seed saving with that under Community Plant Variety Rights, restricts it to potatoes and cereals such as oats and wheat while excluding vegetable species, and obliges all but small farmers to pay equitable remuneration to the right holder.⁸⁵ Similarly, the patent laws of some countries – namely Austria, Germany and Switzerland – provide an exemption for farmers where patented material has been obtained 'accidentally or in a technically unavoidable manner,' thereby creating a *de minimis* exception.⁸⁶ Similarly, under the Art. 12 of the EU Biotech Directive, breeders may request a compulsory licence to use a patented invention when necessary to exploit a plant variety right, but this pathway is not easy to use because the threshold is high and the criteria are not always clear.⁸⁷ Under French patent law protection does not extend to biological materials having the claimed characteristics when they were obtained independently of the patented material and by an essentially biological process (conventional breeding).⁸⁸ Thus, the patent right of a

⁸³ Ragavan and O'Shields (n 39) 97, 121.

⁸⁴ Directive 98/44/EC of the European Parliament and of the Council of 6 July 1998 on the legal protection of biotechnological inventions [1998] OJ L213/13.

⁸⁵ The extent and the condition of such seed saving are determined under art 14 of CPVR, see EU Biotech Directive 98/44/EC (art 11(1); Regulation (EC) No 2100/94, art 14); Similarly, art 7 of Commission Regulation (EC) No 1768/95 defines 'small farmers by production thresholds: for fodder plants, farmers cultivating no more than the area required to produce 92 tonnes of cereals per harvest; for potatoes, no more than the area required to produce 185 tonnes of potatoes per harvest, calculated on the basis of average national yields. Farmers below these thresholds are exempt from paying remuneration to the right holder when re-using farm-saved seed.

⁸⁶ Kock (n 31) 81.

⁸⁷ *ibid* 80; Sven JR Bostyn, 'Towards a Fair Scope of Protection for Plant Breeders' Rights in an Era of New Breeding Techniques: Proposals for a Modernization of the Essentially Derived Variety Concept' (2021) 11 *Agronomy* 1511.

⁸⁸ French Intellectual Property Code, art L.613-2-3 (as amended by Law No 2016-1087 of 8 August 2016) <https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000033033605> accessed 24 September 2025; also see Kock (n 31) 281-82.

⁷⁸ Kock (n 31) 142.

⁷⁹ *ibid*.

⁸⁰ *ibid*.

⁸¹ Correa (n 47).

⁸² Protection of Plant Varieties and Farmers' Rights (PPVFR) Act 2001, s 42 (India); Plant Breeder's Rights Act 1994, s 57 (Australia).

recently patented tomato resistant to ToBRFV does not extend if farmers are able to breed a tomato resistant to ToBRFV without using the patented material. While such a provision would not guarantee farmers' use of patented material for their adaptation and breeding, it is still a way forward to secure their independently developed resistance from falling under the scope of parent holder.

More importantly, as discussed above, there is growing – albeit, still limited – recognition of breeders' exemption in patent law, and the EPC also provides for such an exemption. Although the EU Biotechnology Directive 98/44/EC does not expressly provide a breeders' exemption, Art. 12 on compulsory cross-licensing between patents and plant variety rights may be read as implying one, probably under the statutory research exception.⁸⁹ The call for a full breeders' exemption is emerging from several directions. In their proposal for a unified protection regime replacing patents and PVP rights, Metzger and Zech include a full breeders' exemption along with a farmers' exception, and comprehensive exhaustion.⁹⁰ Similarly, Plantum, the Dutch association of plant breeders, advocates the introduction of a full breeding exemption within patent law.⁹¹ In its amendment to the Commission's draft regulation on products obtained by new genomic techniques (NGTs), the European Parliament observed that current patent law lacks a full breeder's exemption. It therefore proposed that NGT plants should be excluded from patent protection and instead fall solely under the PVP system, which allows the use of a breeder's exemption.⁹² This position, however, was not adopted in the final political agreement, which retained patent protection while introducing patent transparency measures.⁹³

However, calls for a full breeders' exemption in patent law must also address its compatibility with the TRIPS, which establishes minimum standards of intellectual property protection. Article 30 of TRIPS provides exceptions to patent rights. It requires states to allow for exceptions to patent rights only when they are limited, do not conflict with a normal exploitation of the patent, and do not prejudice the legitimate interests of the patent owner the third parties. Over a decade ago, Prifti, and more recently

Bosse, have argued that a purposive interpretation of Arts. 7 and 8 of TRIPS provides sufficient normative space to accommodate a full breeders' exemption, including one that extends to commercialisation, without violating TRIPS obligations.⁹⁴ Stipulating the objective, Art. 7 mentions broader goals like promotion of technological innovation, dissemination of technology, mutual benefit to producer and user, social and economic welfare, and balanced allocation of rights. Similarly, in relation to formulating or amending their laws and regulations, Art. 8 allows members to adopt measures necessary to protect public health and nutrition, and to promote the public interest in sectors of vital importance to their socio-economic and technological development, in line with the agreement. Bosse points that, although *Canada—Patent Protection of Pharmaceutical Products* offered limited and widely criticised guidance on Art. 30 and did not meaningfully incorporate the treaty context provided by Arts. 7 and 8, the Appellate Body's report in *Australia—Tobacco Plain Packaging* (albeit in a trademark context) confirms that the objectives and principles in TRIPS Arts. 7 and 8 provide highly relevant interpretative guidance for broad or ambiguous TRIPS terms, particularly in relation to exceptions.⁹⁵ Prifti argues that the comprehensive exception intended to permit the use of patented products as breeding material in order to enable further improvement is still limited, as required by Art. 30. The exception does not curtail the patentee's right to prevent others from making the patented product, as the breeder's objective is not to reproduce the invention itself but to develop a new plant variety incorporating a protected genetic construct. The creation of a new variety is therefore not equivalent to 'making' the patented product.⁹⁶ Under the comprehensive exception, the patentee retains the right to exclude others from selling, offering for sale, or importing the invention. The only exclusive right affected by the exception is the right to 'use' the product, and even this is limited to use for breeding purposes.⁹⁷ Moreover, the comprehensive exception is confined to plant characteristics and does not extend to protected breeding processes, which constitutes a further specific boundary on the scope of a comprehensive breeding exception.⁹⁸ It is worth noting that Art. 27 specifically allows members to differentiate patent rights in the field of technological plant breeding.

Furthermore, if a full breeders' exemption were considered too broad to comply with Art. 30, a narrower formulation remains possible. One option would be to limit the exemption to the breeding of plant variety in the fields of

⁸⁹ *ibid* 83.

⁹⁰ Axel Metzger and Herbert Zech, 'A Comprehensive Approach to Plant Variety Rights and Patents in the Field of Innovative Plants' in Christine Godt and Matthias Lamping, *A Critical Mind: Hanns Ullrichs Footprint in Internal Market Law, Antitrust and Intellectual Property* (Springer 2023).

⁹¹ Plantum, 'Access to genetic material continues to demand attention' (Plantum, 03/2024) <https://www.plantum.nl/wp-content/uploads/2024/03/2024_FS-intellectueel-Eigendom_EN.pdf> accessed 5 October 2025.

⁹² European Parliament, Amendment 23 to the European Parliament legislative resolution on the proposal for a Regulation on plants obtained by certain new genomic techniques [2024] TA(2024)0067 <https://www.europarl.europa.eu/doceo/document/TA-9-2024-0067_EN.pdf> accessed 5 October 2025.

⁹³ Council of the European Union, 'New genomic techniques: Council and Parliament strike deal to boost the competitiveness and sustainability of our food systems' (Press release, 4 December 2025) <<https://www.consilium.europa.eu/en/press/press-releases/2025/12/04/new-genomic-techniques-council-and-parliament-strike-deal-to-boost-the-competitiveness-and-sustainability-of-our-food-systems/>> accessed 25 January 2026.

⁹⁴ Jocelyn Bosse, 'Strengthening the Role of the Breeder's Exemption in Patent Law' (Queen's University Belfast, 10 November 2025) <<https://pure.qub.ac.uk/en/publications/strengthening-the-role-of-the-breeders-exemption-in-patent-law/>> accessed 10 December 2025; Prifti (n 23).

⁹⁵ WTO, *Canada: Patent Protection of Pharmaceutical Products* – Panel Report (17 March 2000) WT/DS114/R; WTO, *Australia: Certain Measures Concerning Trademarks, Geographical Indications and Other Plain Packaging Requirements Applicable to Tobacco Products and Packaging* – Report of the Appellate Body (9 June 2020) WT/DS435/AB/R and WT/DS441/AB/R; Bosse (n 94).

⁹⁶ Prifti (n 23) 135.

⁹⁷ *ibid*.

⁹⁸ *ibid* 136.

food and agriculture, as suggested in Humboldt White Paper on NGT Patents.⁹⁹ Prifti suggests an option to confine breeders' exemption to the 64 crops listed in Annex I of the International Treaty on Plant Genetic Resources for Food and Agriculture, given their recognised role in advancing the objectives of conservation and the sustainable use of plant genetic resources for food and agriculture.¹⁰⁰ Bosse argues that limiting the exemption to plant species relevant to food and agriculture may make it easier to demonstrate that the measure is proportionate to the pursuit of national policy objectives, given that agriculture falls within the 'sectors of vital importance' referred to in Art. 8 TRIPS. She further notes that the reference to 'nutrition' in Art. 8 supports measures aimed at promoting food security, and that human rights considerations – particularly the right to food as recognised in international human rights law – may reinforce this approach.¹⁰¹ For current analysis, further limiting the application of the exemption to farmer-breeders operating within a government-supervised sandbox would strengthen the case for its compatibility.

As discussed above, IP law and PVP law are developing several mechanisms to safeguard farmers' interests, and there are growing calls for a strengthened breeders' exemption and greater legal clarity. In this context, the proposed Innovation Garden could serve to consolidate these initiatives within a coherent experimental framework, thereby providing legal certainty for farmers engaged in plant breeding, and gathering regulatory knowledge for necessary law reform. The following section will deal with some measures to strengthen the functioning of the Innovation Garden.

2. Mitigating other challenges for Innovation Garden

The effects of regulatory instruments are highly context-dependent, and the conditions shaping industrial innovation differ substantially from those governing farmers' innovation. Unlike actors in financial or technology-driven sectors, farmers do not typically innovate in an entrepreneurial manner because breeding activities are often ancillary to primary agricultural production and are motivated by necessity, personal interest, or collective and community-based practices. At the same time, the legal framework governing plant breeding has developed into a particularly restrictive and, in certain respects, monopolistic regime, characterised by high barriers to entry for farmer-breeders. In this context, and notwithstanding their risks and limitations, Innovation Gardens could work as a regulatory tool for reducing entry barriers and supporting farmers' innovation. Scholarship on regulatory sandboxes emphasises that their design should seek to minimise risks of harm while balancing the potential benefits for innovation and market entry, a concern that

existing sandbox frameworks already recognise and actively manage.¹⁰² While regulatory sandboxes have attracted criticism, most commentators adopt more intermediate positions, questioning specific design features while nonetheless acknowledging that sandboxes are – or at least have the potential to be – a useful policy instrument within the regulatory landscape.¹⁰³

Although regulatory sandboxes are typically conceived as temporary measures, their duration may be extended depending on the regulatory context. In the Netherlands, for example, certain sandbox arrangements have been granted for periods of up to 20 years, demonstrating that extended experimentation is not unprecedented where sectoral conditions so require.¹⁰⁴ As such, Innovation Gardens can be conceived as long-term regulatory structures, as farmers' breeding unfolds over multiple breeding cycles and seasons, rendering short-term sandbox arrangements insufficient for generating meaningful regulatory learning or viable outcomes. Regulatory sandboxes usually operate either through dedicated calls or on a continuous basis. Empirical studies show that fixed application windows can pressure applicants to rush participation,¹⁰⁵ whereas continuous application models offer greater flexibility and distribute administrative burdens more evenly.¹⁰⁶ A continuous application is therefore better aligned with plant breeding as it avoids application surges and enables resource-constrained farmers' groups to prepare and participate accordingly. At the same time, a long-term structure should not result in individual breeding projects remaining indefinitely within a favourable regulatory environment. As cautioned by Ford and Ashkenazy, regulators should avoid situations in which projects merely 'hang out' in a sandbox without a clear experimental purpose, as this risks creating regulatory privilege.¹⁰⁷ In an Innovation Garden, individual breeding projects should enter and exit the framework once their regulatory questions have been addressed, even if the overarching structure itself remains available to accommodate successive projects over time. Such continuity responds to the persistent legal uncertainty in breeding sectors, which currently restricts farmers' breeding activities and undermines state obligations relating to farmers' rights.¹⁰⁸

Similarly, there is a valid concern of scalability of Innovation Gardens, as they may not be able to accommodate all farmers' breeding projects simultaneously. Such limits arise from several factors, including regulatory capacity constraints and public-interest considerations aimed at risk containment.¹⁰⁹ This concern therefore reflects regulatory design choices rather than inherent

⁹⁹ Axel Metzger, Herbert Zech and Michael Kock, 'Whitepaper: Mitigating impact of patents on plants obtained from New Genomic Technique (NGT)' (Humboldt-Universität zu Berlin, 27 January 2025) <<https://www.rewi.hu-berlin.de/de/lfi/lis/mzg/humboldt-white-paper-on-ngt-patents-27-1-2025.pdf>> accessed 25 January 2026.

¹⁰⁰ Prifti (n 23) 136.

¹⁰¹ Bosse (n 94).

¹⁰² Brian R Knight and Trace E Mitchell, 'The Sandbox Paradox: Balancing the Need to Facilitate Innovation with the Risk of Regulatory Privilege' (2020) 72(2) South Carolina Law Review 471.

¹⁰³ Markellos and others (n 58) 10.

¹⁰⁴ Ellen Beckstedde and others, 'Regulatory Sandboxes: Do They Speed up Innovation in Energy?' (2023) 180 Energy Policy 113656.

¹⁰⁵ *ibid.*

¹⁰⁶ Markellos and others (n 58) 13.

¹⁰⁷ Ford and Ashkenazy (n 65) 588.

¹⁰⁸ See United Nations Declaration on Rights of Peasants and Other People working in Rural Areas 2018

¹⁰⁹ Ford and Ashkenazy (n 65) 588.

shortcomings. The broader objective of the Innovation Garden is not to scale participation, but to provide regulatory certainty and generate evidence-based regulatory learning through structured collaboration between farmers and regulators. The Innovation Garden prioritises the inclusion of farmer-breeders rather than the mainstreaming of all plant breeding activities. In this context, a limited scope focused on farmers' breeding projects functions as a safeguard rather than a limitation, as these activities are typically localised, small-scale, and oriented toward use by farmers themselves, who are often both producers and users of seed. Furthermore, the Innovation Garden could operate through a notification system. Such a mechanism would enhance inclusiveness and reduce administrative burdens, as participation would not depend on prior regulatory approval.¹¹⁰ A notification-based system has already been employed in a sandbox in Australia.¹¹¹ Under such a model, farmers – whether acting through clubs, collectives, or participatory breeding programmes – would notify a competent public authority of their breeding activities and the materials used, including protected materials. This would enable regulators to observe compliance, reduce legal uncertainty, and prevent inadvertent infringements, while also facilitating guidance on the conditions under which resulting varieties might subsequently enter the market.

Regulatory sandboxes may be open to all market actors or restricted to specific categories of participants. In practice, participation is often limited to smaller market actors, such as start-ups and small and medium-sized enterprises, which are typically perceived as less powerful.¹¹² For example, in the Netherlands, eligibility for certain energy sandboxes is limited to homeowners' associations and energy communities, while in Spain research institutions are excluded on the ground that they are not considered agents of the electricity system.¹¹³ Similarly, the Innovation Garden could be limited to farmer-breeders, participatory plant breeding initiatives involving farmers, or artisanal seed producers, following consultation with relevant local stakeholders. Participation could further be conditioned on public-interest safeguards, such as limitations on the use of IP on resulting varieties and commitments to make them publicly available. In this way, farmer-breeding activities conducted within the Innovation Garden would avoid generating new exclusive IP rights, thereby preventing preferential treatment and ensuring that public support does not reinforce proprietary models but instead serves broader public-good objectives.

Another related concern with regulatory sandboxes that needs to be considered is that of unequal treatment. Sandboxes may confer a competitive advantage and undermine a level playing field vis-à-vis non-participating firms because they are tailored to specific regulatory challenges and provide selected participants with temporary regulatory relief.¹¹⁴ It should be noted that the mechanism is designed to support farmer-breeders against legal uncertainty and fragmented regulatory obligations within the existing system. Nevertheless, to address the concerns of unequal treatment, regulators should ensure that participation is not equated with good faith nor non-participation with bad faith and adopt clear enforcement guidance to guarantee comparable treatment of sandbox and non-sandbox actors acting in good faith, supported by transparency measures.¹¹⁵ One approach to enhancing inclusiveness is to lower or remove substantive and procedural entry restrictions. As Knight and Mitchell note, sandbox models that rely on narrow criteria risk excluding marginal actors whose activities raise regulatory uncertainty but are not deemed sufficiently 'innovative' by regulators.¹¹⁶ Adopting a broader conception of innovation, combined with the above mentioned notification-based mechanisms, may therefore expand access to sandbox participation. In this regard, Reinhardt suggests that the traditional two-actor architecture of regulatory sandboxes, centred on the state and industry, should be expanded into a multi-actor model encompassing the state, industry, citizens, and other relevant stakeholders. In this model, citizens are not merely consulted but are recognised as constitutive actors involved in the co-design, testing, and evaluation of regulation.¹¹⁷

Similarly, transparency throughout the sandbox process is essential to public accountability and trust and aligns with rule of law principles such as legal certainty, predictability, and non-arbitrariness.¹¹⁸ This includes public disclosure of the sandbox's objectives, duration, and regulatory limits, as well as timely information on entry procedures, selection criteria, decisions, and the scope of privileges granted to participants.¹¹⁹ In designing and operating a sandbox, regulators should engage not only with professional stakeholders but also with representatives of vulnerable or marginalised groups who face structural barriers to access, including those related to geography, income, etc.¹²⁰ During experimentation participants may experiment within the sandbox, subject to compliance with applicable conditions and reporting obligations. During this period, the sandbox authority monitors and supports participants through proportionate supervision, including the review of reports, informal check-ins, and ongoing communication, and may adjust

¹¹⁰ Knight and Mitchell (n 102) 458.

¹¹¹ The Australian Securities and Investment Commission sandbox was based on a notification system and did not require prior regulatory approval for a firm to participate. It lacked a front-loaded application process; firms were only required to notify ASIC of their intention to rely on the exemption and to provide information demonstrating that they met the necessary eligibility criteria. At the same time, the sandbox imposed prescriptive requirements, including limits on the number of customers and the value of transactions, obligations to maintain adequate resources to compensate customers in the event of mishap, and mandatory disclosure obligations (Knight and Mitchell (n 102) 458).

¹¹² Ranchordas and Vinci (n 56) 135.

¹¹³ Beckstedde and others (n 104) 5.

¹¹⁴ Ranchordas and Vinci (n 56) 133.

¹¹⁵ Knight and Mitchell (n 102) 474.

¹¹⁶ *ibid* 471–72.

¹¹⁷ Reinhardt (n 74) 2.

¹¹⁸ Ford and Ashkenazy (n 65) 580.

¹¹⁹ *ibid*.

¹²⁰ *ibid* 595.

reporting requirements as necessary based on emerging information and potential risks.¹²¹

The governance of a sandbox significantly shapes its innovative and regulatory learning potential. Where involvement of a concerned ministry is absent, the scope of experimentation may be constrained, while the absence of a concerned regulator may limit opportunities for regulatory learning.¹²² One option to address this tension could be bifurcated governance models in which regulator retains its traditional role, but day-to-day sandbox operations are delegated to an arms-length specialist body with relevant expertise and independence.¹²³ Regulatory capacity may be affected by factors like limited financial resources, specialised staff, and robust accounting and auditing systems.¹²⁴ Empirical evidence suggests that sandboxes are disproportionately adopted in high-income and OECD countries, where regulatory capacity is stronger, while remaining rare in developing countries, potentially constraining innovation in those contexts.¹²⁵ The strength of a sandbox therefore lies in capacity-aware design, relying on realistically scoped experiments, predefined objectives, pooled resources across agencies, and shared responsibilities between regulators and innovators rather than continuous, intensive supervision. In the context of plant breeding, relevant regulatory capacity already exists in plant variety protection offices and seed authorities, allowing for resource pooling. Furthermore, international funding mechanisms, such as benefit-sharing funds available under the ITPGRFA, could also be mobilised to support the establishment and operation of Innovation Gardens in developing countries.

The fact that seeds have already been subject to experimental regulatory regimes demonstrates that both regulatory frameworks and implementation experience exist, which can inform Innovation Garden design. The provision for temporary experiments in the EU seed marketing regime allows marketing of heterogeneous populations which do not fulfil the seed marketing criteria of DUS. For instance, on the basis of Art. 13a of Directive on marketing of cereal seeds (66/402/EEC), which provides grounds for temporary experiment on the basis of which Member States may exercise derogation from the obligation under the directive.¹²⁶ Based on the Art. 13a, a temporary experiment was launched to allow marketing of heterogeneous populations of four species (wheat, barley, oats and maize) because new research showed that there could be benefits of using non-uniform diverse material – with regards to organic production or in low input agriculture for example – to reduce the spread of diseases (Recital 2).¹²⁷ It permitted the marketing of non-certified seed materials notified to public authorities which participated in the experiment, in order to explore possible

approaches for identifying these diverse populations.¹²⁸ The registration of heterogeneous material relied on the description of the material, the breeding schemes used, the region of production, the degree of heterogeneity and characteristics of the population.¹²⁹ All applicants and producers were also required to register to ensure traceability and data collection, and quantitative limits were set.¹³⁰ The temporary experiment registered 35 populations and enabled the marketing of 100 tons of seed. Despite its modest size, it paved the way for EU legislation on heterogeneous material, recognising innovative work of farmers as breeders.¹³¹ The temporary experiment on cereal population also contributed to introduction of derogation in EU Organic Regulation which allows marketing of seeds from organic heterogeneous material (OHM).¹³² Similar provisions for temporary experimentation are present across other directives,¹³³ but these provisions have not been used. However, it is interesting to note that compared to the corresponding provisions in the other seed marketing Directives, Art. 19 of the Potato Directive (2002/56/EC) is the only one that explicitly excludes plant-health provisions from the scope of possible temporary experiments. This implies that with all other directives, including vegetables, temporary derogation can be done under such temporary experiments even for plant health provisions. Similarly, although only in preamble, OHM regulation also has a path towards a temporary experiment to assess the criteria for the description, production and marketing of seeds from 'organic varieties' (Recital 39).¹³⁴ The purpose of experimentation is to foster research and to develop organic varieties suitable for organic production (Recital 39).¹³⁵ Thus, the existence of experimental frameworks within seed marketing law demonstrates that seeds as material and plant breeding as an activity are suitable for inclusion within an experimental legal regime.

Innovation Garden, therefore, can offer a neutral and protected space for engaging in direct dialogue with regulators to identify legal and regulatory barriers specific to

¹²⁸ Batur, Bocci and Bartha (n 13).

¹²⁹ *ibid* 10.

¹³⁰ Quantitative limits were set at a maximum of 0.1% of the total seed of the same species produced that year in the participating Member State see *ibid*.

¹³¹ Batur, Bocci and Bartha (n 13); Ambrogio Costanzo and others, 'Main outcomes and SWOT of experiences from marketing populations under the Temporary Experiment into the commercialisation of heterogeneous populations in the European Union (WP2, T2.1.3)' (*liveseed*, 28 May 2018) <https://www.liveseed.eu/wp-content/uploads/2019/07/LIVESEED_MS2.8_heterogeneous_material_marketing_May_version_internal-document.pdf> accessed 10 December 2025.

¹³² EU Organic Regulation 2018/848.

¹³³ Fodder plant seeds 66/401/EEC, art 13a; beet seed 2002/54/EC, art 19; vegetable seed 2002/55/EC, art 33; oil and fibre plant seed 2002/57/EC, art 16 and seed potato 2002/56/EC, art 19.

¹³⁴ Regulation (EU) 2018/848 of the European Parliament and of the Council of 30 May 2018 on organic production and labelling of organic products and repealing Council Regulation (EC) No 834/2007; art 3(19) defines organic variety which is different from organic heterogeneous material.

¹³⁵ It has been activated to start the temporary experiment on modified DUS criteria for organic varieties. See <https://orgprints.org/id/eprint/42327/1/3%2017.45-18.00_Messmer_Legal%20framework_Temporary%20Experiment_Section_Organic_v3.pdf> accessed 7 October 2025.

¹²¹ *ibid* 591.

¹²² Beckstedde and others (n 104).

¹²³ This is illustrated by the Utah Office of Legal Service Innovation (Ford and Ashkenazy (n 65)).

¹²⁴ Markellos and others (n 58) 22.

¹²⁵ *ibid* 2-3.

¹²⁶ Council Directive of 14 June 1966 on the marketing of cereal seed (66/402/EEC), art 13a.

¹²⁷ Commission Implementing Decision 2014/150/EU.

on-farm plant breeding. Through this collaborative process, farmer-breeders can work with regulators to develop context-specific solutions that recognise the distinct nature of their practices.¹³⁶ Based on experience in the Innovation Garden, the regulator might propose legal changes or offer new interpretations of existing laws and provide guidance on how to apply regulations.¹³⁷ During the above-mentioned temporary experimentation on cereal populations, and in constant dialogue with public authorities, a farmers' network helped to establish procedures for on-farm certification of the populations; develop transparent labelling reflecting the participatory breeding process; define the actors involved and social rules associated with the seed packages; and create a financial mechanism enabling a self-sustaining research and development model.¹³⁸ Such experimental legislation can facilitate compromise or help persuade critics and those sceptical of a particular rule by demonstrating its benefits. Moreover, experimental laws and regulations have supported decentralisation by allowing legal experimentation at the local level, enabling decentralised authorities to operate within their own competences and tailor national policies to local contexts and needs.¹³⁹

The Innovation Garden can be grounded in existing initiatives, farmer-led movements, and legal reforms that have sought to support and empower farmers. The role and capacity of farmers' in plant breeding have been acknowledged and integrated into numerous participatory breeding programmes.¹⁴⁰ Similarly, community seed banks – farmer-led initiatives that conserve and manage local crop diversity – are found across the Global South and increasingly in the Global North.¹⁴¹ They preserve local varieties, distributing quality seed to support agrobiodiversity and seed security.¹⁴² Together, these efforts demonstrate not only the farmers' role and capacity as plant breeders but also provide a practical foundation for establishing such an experimental legal regime. By building on these experiences, the Innovation Garden can offer a structured yet flexible framework that supports and legitimises farmers' ongoing breeding practices. It also responds to growing calls for food democracy by embedding farmers within participatory and deliberative

governance structures that emphasise decentralised innovation and transparency.¹⁴³

4. Concluding thoughts

This article has examined how the expansion of IP protection in plant-related innovations has narrowed the practical space for farmer-led breeding and increased legal uncertainty around access, use, and further improvement. While farmers continue to breed plants with a wide range of materials, including IP protected varieties, they may face restrictions arising from infringement risks, high enforcement costs, and uncertainty surrounding the scope of laws governing seeds. Legal certainty is therefore an important concern for farmer-breeders to continue engaging in breeding. To respond to these constraints, the article has proposed the Innovation Garden as an experimental legal regime inspired by the regulatory sandbox. Through Innovation Garden farmer-breeders could pre-declare breeding activities and work under oversight of a regulator in a protected environment. It reduces regulatory uncertainty through guidance, monitoring, and regulatory flexibility. Experience generated through its operation can inform future law reform and support the development of interpretative approaches that are sensitive to farmers' needs. Properly designed, the Innovation Garden therefore offers a neutral and legally secure space for dialogue between farmer-breeders and regulators, reducing inadvertent infringement risks, and supporting locally situated innovation that is often both small-scale and oriented towards practical needs. By enabling local experimentation and legal flexibility, the Innovation Garden has the potential to secure freedom of operation as well as contribute to promotion of seed diversity, supporting farmers' rights, and contributing to food sovereignty.

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¹³⁶ Bonca and Jablonska-Bonca (n 59) 307.

¹³⁷ *ibid.*

¹³⁸ Riccardo Bocci and others, 'Yield, Yield Stability and Farmers' Preferences of Evolutionary Populations of Bread Wheat: A Dynamic Solution to Climate Change' (2020) 121 *European Journal of Agronomy* 126156; also see Batur, Bocci and Bartha (n 13).

¹³⁹ Ranchordas (n 55).

¹⁴⁰ Conny Almekinders and Jaap Hardon (eds), *Bringing Farmers Back into Breeding. Experiences with Participatory Plant Breeding and Challenges for Institutionalisation* (2006) *Agromisa Special* 5; Salvatore Ceccarelli and Stefania Grando, 'Participatory Plant Breeding: Who Did It, Who Does It and Where?' (2020) 56(1) *Experimental Agriculture* 1.

¹⁴¹ Ronnie Vernooy and others, 'Promising Strategies to Enhance the Sustainability of Community Seed Banks' (2024) 16 *Sustainability* 8665.

¹⁴² *ibid.*

¹⁴³ Reinhardt (n 74).