



Funded by the Horizon 2020 Framework Programme of the European Union

Farmer's Pride

Networking, partnerships and tools to enhance *in situ* conservation of European plant genetic resources

Effectiveness of existing levels of *in situ* support for landrace conservation and use in Europe

Citation

Drucker, A.G., Tyack, N., Bartha, B., Fehér, J., Koutis, K., Maierhofer, H., Maxted, N. and Ralli, P. 2021. Effectiveness of existing levels of *in situ* support for conservation and use in Europe. Farmer's Pride: Networking, partnerships and tools to enhance *in situ* conservation of European plant genetic resources.

Acknowledgements

The authors wish to acknowledge the input of all the participating national partners. These include (in country alphabetical order): Austria – Magdalena Aigner, Roland Selinger and Irina Suanja (Arche Noah), as well as data which was provided by the Austrian Federal Ministry for Agriculture, Regions and Tourism; Greece – Konstantinos Krommydas and Irene Tzouramani (Hellenic Agricultural Organization – DIMITRA), and Areti Alexopoulou, Stela Chatzigeorgiou, Grigoris Datsiadis, Vasilis Ioannidis, Mary Nathanailidou and Christina Vakali (AEGILOPS Network on behalf of Hellenic Agricultural Organization-DIMITRA), as well as data which were provided by the Hellenic Ministry of Rural Development and Food; Hungary – Bence Trugly and Lili Barta; Switzerland – Matthias Burkhalter and Seraphina Bieri (ProSpecieRara); and UK – Mike Ambrose (John Innes Research Centre) and Olivia Shoemark (University of Birmingham). We are also grateful to all the participating farmers.

This document is a deliverable of the Farmer's Pride Project: D 3.1 – Socio-economic analysis of the effectiveness of existing levels of support mechanisms and funding for crop wild relative and landrace conservation and use.

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Summary

The European Union's (EU) Common Agricultural Policy (CAP) is considered to be the critical public policy in terms of both impacts and funds dedicated to the conservation of biodiversity. Its second pillar Rural Development Plans contain policy measures that relate to "*environmental, climate and other management commitments*" comprise a wide range of activities that are particularly relevant to the conservation, sustainable use and development of genetic resources.

Under the current CAP, a number of institutional arrangements were identified through a desk review/expert consultation. The Alpine countries (Austria and Switzerland) have large formal annual direct support programmes, while relatively less wealthy but higher diversity countries such as Greece have had more modest and temporary ones. By contrast, Hungary and the UK have no direct support programmes at all. Support payments for wheat landraces, where they exist, were in the range of €120–€251/ha; although relatively little of the existing support, even in those countries with large programmes, is focussed specifically on wheat landraces (Austria 1.2% and Greece 8.3%).

Results from the farmer survey designed to assess the willingness of wheat farmers to participate in on-farm conservation of wheat landraces, reveal that conservation costs, although exhibiting high heterogeneity, amount to an average cost of between €300–550/ha. Assuming that such costs are also representative of non-wheat landraces, together with a further 20% for monitoring and administration costs, 1,000¹ landraces covering a range of crops could be each conserved at five different sites² on at least 1 ha at each site (=5 ha/landrace) for a total cost of €22.4m-€41.1m (equivalent to €1.8m - €3.3m p.a.) over 20 years at a 5% discount rate. However, such a strategy might be viewed as overly dependent on relatively few farmers and a more ambitious conservation target might instead take into account not only area and configurations (which support such ecosystem services as resilient landscapes and geneflow/maintenance of the underlying evolutionary processes) but also farmer numbers (which support maintenance of ecosystem services related to traditional knowledge and cultural practices). Ensuring a minimum number of 50 farmers³ per landrace each with 1 hectare of land (=50 hectares/landrace) would cost ten times as much (€18m -€33m p.a.), but still compare favourably with the general public's demand for such conservation and their willingness to pay for it. It is also well within the planned CAP Rural Development budget for the 2021–2027 period, which amounts to a total of €95.5 billion, although relatively little of this is currently earmarked for landrace (LR) /crop wild relatives (CWR) conservation.

¹ Given only rough estimates of landrace numbers and the absence of risk status data for many of them, it is assumed that, even in those countries where a list of threatened species and/or a list of eligible landraces/traditional varieties for support is maintained, not all threatened varieties may be listed, leading to an underestimate. Under D3.1, Austria estimated the existence of 3,000 landraces of which 75 (2.5%) are currently receiving support. Switzerland estimated it had similar number of landraces, while Hungary reported 4,000, the UK 1,200–1,500 (where the majority are considered to be threatened) and Greece 6,000. Thus, 1,000 landraces would represent \approx 5% of the current portfolio, which is significantly more than is currently supported.

² Given the absence of widely recognised risk thresholds/conservation targets for landraces (unlike the case of animal genetic resources), following Brown and Briggs (1991) in the context of the *in situ* conservation of minimum population sizes of crop wild relatives, we propose a conservation strategy based on securing five populations across discrete ecogeographic zones. Brown, A.H.D. and Briggs, J.D. 1991. Sampling strategies for genetic variation in ex situ collections of endangered plant species. In: Falk, D.A. and Holsinger, K.E. (eds.), Genetics and conservation of rare plants. Pp 99-119. Oxford University Press. New York.

³ Drawing on Drucker and Ramirez (2020, p.7), who model landrace conservation costs involving a minimum of 50–100 farmers.

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Estimated on-farm conservation costs (€1.8m–€33m p.a.) are well within the general public's willingness to pay (€80.2m p.a.⁴).

Current support payment levels ($\leq 120 - \leq 251/ha$.), where they exist at all, are on average below that stated by farmers as necessary to cover their opportunity costs ($\leq 300 - \leq 550/ha$). Furthermore, given the high heterogeneity in farmers' willingness-to-accept (WTA) compensation for participating in public good conservation activities, exploration of the potential for improved cost-effectiveness to be achieved through the use of conservation tender mechanisms⁵ should urgently be explored. Differences between the mean and 25th percentile conservation costs suggest that the cost savings could range from 21-60% (by helping to recruit the lowest-cost farmers and using discriminatory pricing) relative to the way direct support payments are currently allocated based on an average uniform payment per conservation unit (such as area or livestock unit).

Such a tender mechanism approach, when implemented in conjunction with clear conservation performance targets (such as areas under threatened landrace cultivation, number of farmers involved, spatial configuration, seed access and exchange) as used in payment for ecosystem service (PES)-based Payments for Agrobiodiversity Conservation Schemes (PACS)⁶ elsewhere, could also contribute to the new CAP post-2020 proposals, to shift focus from compliance to performance while adhering to the public funding for public goods principle, as well as ensuring a fairer distribution of direct payments.

In particular, the **conditionality** associated with PACS/PES approaches sits well with the move "from compliance to performance"; while the ability to **differentiate payments** under a tender mechanism can support **a move away from fixed payments/hectare**—which is viewed as contributing to the inequitable impact of current CAP support payments. Further consideration of **distributional/socialequity issues** can also be facilitated by the use of a tender mechanism by favouring the selection of conservation offers that involve poorer farmers (or other vulnerable groups) or younger farmers to support generational succession⁷.

Given that formal support schemes (€200/livestock unit under the new CAP) exist for animal genetic resources, while **at best only ad hoc support schemes exist for landraces**, the EU as a whole, as well as national policymakers, **urgently need to explore mechanisms through the CAP (and for non-EU countries, their national legal instruments⁸) to systematically support the on-farm conservation of Europe's agricultural heritage of landrace/traditional varieties of wheat and other crops.**

⁴ See Drucker, A.G. *et al.* 2021. Public willingness to pay for agrobiodiverse-related goods and services in Europe. Farmer's Pride: Networking, partnerships and tools to enhance *in situ* conservation of European plant genetic resources.

⁵ Narloch, U., Drucker, A.G. and Pascual, U. 2011. Payments for agrobiodiversity conservation services (PACS) for sustained on-farm utilization of plant and animal genetic resources. Ecological Economics 70(11):1837-1845.

⁶ Drucker, A. and Ramirez, M. 2020. <u>Payments for Agrobiodiversity Conservation Services</u>: An Overview of Latin American experiences, Lessons Learned and Upscaling Challenges. Land Use Policy: 99.

⁷ Narloch, U., Pascual, U. and Drucker, A.G. 2013. How to achieve fairness in payments for ecosystem services? Insights from agrobiodiversity conservation auctions. Land Use Policy 35:107-118.

⁸ Such as the 2020 UK <u>Agriculture Bill</u>, which states "*The Secretary of State may give financial assistance for or in connection with any one or more of the following purposes:......(i) conserving plants grown or used in carrying on an agricultural, horticultural or forestry activity, their wild relatives or genetic resources relating to any such plan*" [Chapter 21, Part 1 (Financial Assistance), Chapter 1 (New Financial Assistance Powers), Article 1 (Secretary of State's powers to give financial assistance), Item 1.i]

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1.0 Introduction: EU Incentive Mechanisms under the CAP

The European Union's (EU) Common Agricultural Policy (CAP) is considered to be the critical public policy in terms of both impacts and funds dedicated to the conservation of biodiversity (Batáry et al., 2015)⁹.



Figure 1. Historical development of the Common Agricultural Policy Source: European Commission (2015).

Milestones related to a series of reforms since its inception in the 1960s (see Figure 1) have included the transition from a classical price support system (including associated border measures) to a system of direct support (initiated with the 1992 Reform), the introduction of a second pillar on Rural Development Programs (Agenda 2000), and the decoupling of direct payments from production (initiated with the 2003 reform). The last reform (CAP post 2013) offered a more holistic and integrated approach to policy support (emphasizing linkages between pillars) relative to the previous policy, while it also introduced a new architecture of direct payments, aimed at a better targeted, more equitable and greener CAP¹⁰.

Despite this greening of the CAP, overall, as compared with the EU 2010 biodiversity baseline, biodiversity loss and the degradation of ecosystem services in the EU have continued¹¹. While most such references to the impact on biodiversity refer in practice to wild diversity, including on farmlands, the CAP also has an important impact on agrobiodiversity, a significant proportion of which is

⁹ Batáry, P., Dicks, L.V., Kleijn, D., & Sutherland, W.J. 2015. The role of agri-environment schemes in conservation and environmental management. Conservation Biology, 29(4):1006–1016. https://doi.org/10.1111/cobi.12536. ¹⁰ Jongeneel, R.A. 2018. Research for AGRI Committee – The CAP support beyond 2020: assessing the future structure of direct payments and the rural developments interventions in the light of the EU agricultural and environmental challenges, European Policies, Parliament, Policy Department Cohesion for Structural and Brussels. https://www.europarl.europa.eu/RegData/etudes/STUD/2018/617502/IPOL_STU%282018%29617502_EN.pdf ¹¹ European Commission (2015). Report from the Commission to the European Parliament and the Council. The mid-term review of the EU Biodiversity Strategy to 2020 (COM/2015/0478). Retrieved from the Official Journal of the European Union website: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX %3A52015DC0478.

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considered at risk (both plant¹⁰ and animal genetic resources¹¹). The Rural Development Plan second pillar of the CAP comprises eight policy measures of which those related to the first¹², "environmental, climate and other management commitments", comprise a wide range of activities that are potentially particularly relevant to the conservation, sustainable use and development of genetic resources.

As compared to the post-2013 CAP reform, the new CAP post 2020 proposals imply a number of changes that have important potential implications for LR conservation incentive mechanisms. These will be discussed in further detail following an analysis of the results generated in the farmer and general public surveys. The changes include¹⁵:

- a. Rebalancing of responsibilities, allowing more Member State (MS) discretion in measure implementation and design (subsidiarity)
- b. Moving from compliance to performance or action to results
- c. Fairer distribution of direct payments o Direct payments are the main instrument used to support farm incomes, consuming about 70% of total CAP expenditure. However, such payments have been unequally distributed and poorly targeted. For example, in 2015 in the EU28, 81% of the farmers received only 20% of the direct payments¹³. Higher income farmers and larger farmers have received the most support.
- d. Enhancing ambitions \circ Target values for output and results-indicators will need to be developed as part of the move from compliance to performance. However, care needs to be taken in ensuring that such targets are sufficiently ambitious, as there is a risk that they are otherwise set in a way merely to avoid risks of non-compliance.

2.0 Existing Incentive Mechanism Desk Review/Expert Consultation

2.1 Method

An institutional analysis of any existing (economic) incentive mechanisms and support projects for the conservation of landraces/traditional varieties (LR) was carried out through a desk review and expert consultation led by the national partners in the farmer survey countries (Austria, Greece, UK) and additionally Hungary and Switzerland, as these countries are also included in the general public survey analysis. This included a review of EU Rural Development Programme (RDP) support plus any national initiatives. Key information collated related to the following:

- Population status and trends of landraces/traditional varieties
- Existence of a threatened landraces/traditional varieties list

Commission on Genetic Resources for Food and

¹⁰ For example, a recent review by Shoemark and Maxted (unpublished) of landraces in the Scottish Islands found between 2003 and 2018 a reduction in population numbers in Orkney of 31.5%, Shetland of 42.8% and Western Isles 21%.

¹¹ Globally, Europe and the Caucasus are the region with the highest proportion of their breeds classified as being at risk (31% of mammalian breeds and 35% of avian breeds) [FAO, 2015]). FAO. 2015. The Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture, edited by B.D. Scherf & D. Pilling. FAO

Agriculture Assessments. Rome (http://www.fao.org/3/a-i4787e/index.html).

¹² The other policy measures are: (ii) natural or other area-specific constraints; (iii) area-specific disadvantages resulting from certain mandatory requirements; (iv) investments; (v) installation of young farmers and rural business start-up; (vi) risk management tools; (vii) cooperation; and the cross-cutting measure (viii) knowledge exchange and information. ¹⁵ Jongeneel, 2018. *Ibid*

¹³ European Commission (2017a), Modernising and simplifying the CAP; Socio-Economic challenges facing agriculture and rural areas. Brussels. European Commission (2017b) EC (2017b), Report on the distribution of direct payments to agricultural producers (financial year 2016); Brussels.

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- Criteria for inclusion on such a list and recognition of differentiated risk levels
- Existence of data related to <u>wheat</u> landraces/traditional varieties cultivated area and farmer numbers
- Types of support mechanisms, criteria for participant eligibility, payment levels and impacts.

2.2 Results

The full survey results are presented in Appendix I, with key findings summarised in Table 1 below. These include the following:

- Expert opinion plays a key role in the inclusion of specific landraces on threat lists, in part due to the lack of data for potential indicators (e.g. variety/cultivar areas and farmer numbers).
- No recognition of differing threat levels is used to determine support payments in any of the sample countries.
- There are a range of institutional arrangements, with the Alpine countries. (Austria and Switzerland) having large formal annual direct support programmes; while relatively less wealthy but higher diversity countries such as Greece have had more modest and temporary ones. By contrast, Hungary and the UK have no direct support programmes at all. This contrasts with the widespread support for threatened animal genetic resources under the CAP.
- Support payments for wheat landraces, where they exist, were in the range of €120–€251/ha.
- Relatively little of the total existing support, even in those countries with large programmes, is focussed specifically on wheat landraces (Austria 1.2% and Greece 8.3%).

Table 1: Summary of existing (economic) incentive mechanisms and support pr	ojects
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	Austria	Greece	Hungary	Switzerland	ИК
1) Population status and trends of landraces/traditional varieties	Main cultivated landraces all <u>listed for</u> <u>agro-environmental programme</u> <u>support</u> , which covers 24 species and 75 varieties (= 47 of grain, corn and sorghum; 8 of buckwheat and leguminous crops; 5 varieties of potatoes and root crops; 7 varieties of oil and fibre plants; and 8 varieties of vegetable crops. Total area cultivated under 9 supported wheat varieties, involving 47 farms, has declined from 675 ha to 173 ha between 2007 and2017. At least 3,000 landraces/local varieties (all crops).	Traditional cereal varieties cultivated account for <1% of the total acreage and a similar trend is occurring with vegetable crops now being rapidly displaced even from backyard gardens. Many tree crops and vineyards continue to make use of traditional varieties, but the number of varieties used on a large scale has been substantially reduced. The list of landraces threatened by genetic erosion covers 38 species and 173 varieties of legumes and vegetables and 85 varieties of fruit trees, olives and grapevines) Approximately 6,000 landraces/local varieties (all crops).	Landraces found principally in gene banks and home gardens. No market production. Registration regulated by Ministry decrees. Approx. 80 landraces registered and included on National Variety List (no wheat landraces).	All officially maintained accessions are compiled in the "National positive list". This includes 1,584 cereals, 74 industrial plants (fibre, oil, etc.), 311 maize, 671 vegetables, 55 potatoes, 283 berries, 367 fodder plants, 3,323 fruits, 153 vine-accessions and 168 medicinal plant accessions. At least 3,000 landraces/local varieties (all crops)	Significant landrace resources in cereals, vegetable, fruits and forages, but population sizes are decreasing overall. Approx. 200 landraces (all crops) on farm and 1,400 in total.
2) Threatened landraces/traditional varieties list	Yes	Yes	None	Yes	None
3) Criteria for inclusion on list and recognition of differentiated risk levels	Based on expert opinion; be of national origin; and have regional value. No differentiation between risk levels.	Based on expert opinion and information from the local rural services. Landraces included on the list are subject to genetic erosion, were cultivated in the past, or no longer cultivated. No differentiation between risk levels.	N/A	Based on expert opinion (landraces) and, tree numbers and total production (in the case of fruit). Must be of national origin. No differentiation between risk levels.	N/A

	Austria	Greece	Hungary	Switzerland	ИК
4) Existence of data related to areas and number of farmers cultivating wheat landraces/traditional varieties	Yes	Yes	No	No, but potentially possible to obtain through the related network partners.	No
5) Types of support mechanisms	Direct support payments (€200/ha for corn, potatoes and vegetables; €120/ha, for all other species). Some state-level support for access to seeds, facilitating commercial partnerships and organizing annual networking and extension meetings (29 farms, 7.6 ha)	2007-12 Direct support payments (€251/ha-€600/ha for cereals, legumes and vegetable landraces; €304/ha-€900/ha for fruit trees and grapevines). Potential for programme to re-start post 2020 271 farmers in 21 regions received direct support payments covering 497 hectares for the cultivation of landraces. 57 farmers in 13 regions received direct support payments covering 167 hectares of durum and bread wheat, einkorn, oat, rye and barley species (2011)	None	Genebank accession propagation, breeding and improvement.	Only indirectly (via general environmental stewardship scheme).
6) Direct support payments eligibility and impact	No mixtures of cultivars; min 0.1 ha – max 10 ha per cultivar and 20% of the total agricultural area. Increasing overall trend in farm numbers and areas during 2010–17. Cultivation of several species (spelt, Emmer and Einkorn wheat, poppy) has increased, while although that of traditional varieties of rye, barley, wheat and oat has not they have least maintained a certain area threshold. Nonetheless, some varieties continue to be at risk of extinction on farm.	Landraces/local varieties not registered in the national catalogue and old varieties derived from landraces.	N/A	All landraces/traditional varieties on the "positive list" are eligible to apply for conservation programme support (CHF3.2m) or sustainable use activities (CHF1.6m).	N/A

	Austria	Greece	Hungary	Switzerland	ИК
7) Direct support payments funding (p.a.) for:					
wheat landracesall landraces	€20,000 €1.72m	€21.400* €259,000	€0	>CHF3.2m (≈€2.98m)	€0

* Of which €9,000 for the three wheat landraces surveyed.

Source: Farmer's Pride Desk Review and Expert Consultation

3.0 Farmer Survey

3.1 Background

With the aim of exploring the willingness of European farmers to participate in the on-farm conservation of landraces/traditional varieties, a case study survey of smallholder farmers cultivating a commodity crop (wheat) found across Europe was realised in three countries.

3.2 Method

The survey was developed through an expert consultation and in collaboration with the national partners in Austria, Greece and the United Kingdom. Following a piloting phase, the full survey was realised between the spring of 2019 and the end of summer 2020. Two-hundred and seven¹⁷ farmers were interviewed either on the phone or in person to determine, through the use of a stated preference method, how much they would have to be compensated ("Willingness-to-accept" [WTA]) to grow any or all of three specific wheat landraces on one hectare of land.

The selected wheat landraces reflected a diversity of uses, risk statuses and national geographies, and were as follows:

- Austria: Laufener Landweizen, Sipbachzeller Weizen, Rinner Winterweizen
- Greece: *Limnos* (Durum wheat), *Skliropetra/skilopetra* (bread wheat), *Kaploutzas* (Einkorn) United Kingdom: *N49, Squareheads Master, Rampton Rivet* (all thatch varieties).

3.3 Results

Overall, the results from the farmer survey designed to assess the willingness of wheat farmers to participate in on-farm conservation of wheat landraces, reveal that average conservation costs amount to between $\leq 300-550/ha$.

Table 2 provides some summary statistics by country. Austrian farmers were willing to accept the least to cultivate wheat landraces (mean WTA value of ~€300), followed by U.K. farmers (~€1,400) and finally Greek farmers (~€550). We also find substantial heterogeneity between the maximum and minimum values, and between wheat landraces, with farmers' often WTA different values for different landraces or only showing willingness to cultivate one or two of the three included landraces. Farmers also differed greatly in the amount of land they would plant to the given landraces, with areas ranging from 0.5 to 43 hectares in the case of Greek farmers.

	Austria ¹⁷	UK ¹⁸	Greece
Max WTA value	€ 1000	€1,396	€ 3000
Min WTA value	€ 100	€170	€17
Mean WTA value	€ 297	€ 447	€ 556
25 th percentile	€ 120	€283	€ 450
% Difference between Mean and 25 th Percentile	60.0%	36.8%	20.9%
Source: Farmer's Pride farmer survey			

¹⁷ Austria [n=47], Greece [n=100] and the U.K. [n=60]

¹⁸ UK figures expressed in Euro equivalent based on an average exchange rate during the survey period of GBP 1 = Euro 1.13 The differences between the maximum and mean WTA values and the minimum and 25th percentile WTA values indicate that a conservation tender approach can potentially deliver significant cost savings (by helping to recruit the lowest-cost farmers and using discriminatory payments) relative to the way direct support payments are currently allocated based on an average uniform payment per conservation unit (such as area or livestock unit).

4.0 Discussion and Recommendations

Estimated conservation costs ($\leq 1.8m - \leq 33m$ p.a.) are well within the general public's willingness to pay ($\leq 80.2m$ p.a.), resulting in a high benefit-cost ratio (2.4– 44.6). Given the public's levels of WTP for wheat landrace conservation, which—even at the relatively low levels found in the Alpine countries and the UK—is sufficient to fund critical conservation interventions, there is potential to better align agrobiodiversity conservation funding with EU citizens' preferences for the conservation of agricultural diversity.

Current support levels—ranging between ≤ 120 and ≤ 251 /ha.), where they exist at all—are on average below levels stated by farmers as necessary to cover their opportunity costs ($\leq 300 - \leq 550$ /ha). Furthermore, given the high heterogeneity in farmers' WTA compensation for participating in public good conservation activities—including across different landraces—exploration of the potential for improved cost-effectiveness to be achieved through the use of conservation tender mechanisms¹⁴ should urgently be explored. Savings relative to a uniform payments approach could be significant (2160%).

Such a tender mechanism approach when implemented in conjunction with clear conservation performance targets (such as areas under threatened LR cultivation, number of farmers involved, spatial configuration, seed access and exchange) as used in PES-based Payments for Agrobiodiversity Conservation Schemes²⁰ elsewhere, could also contribute to the new CAP post-2020 proposals to shift focus from compliance to performance, while adhering to the public funding for public goodsprinciple, as well as ensuring a fairer distribution of direct payments.

In particular, the conditionality associated with PACS/PES approaches sits well with the move "from compliance to performance"; while the ability to differentiate payments under a tender mechanism can support a move away from fixed payments/hectare – which is viewed as contributing to the inequitable impact of current CAP support payments. Further consideration of distributional/socialequity issues can also be facilitated by the use of a tender mechanism by favouring the selection of conservation offers that involve poorer farmers (or other vulnerable groups) or younger farmers to support generational succession¹⁵.

Given that formal support schemes (€200/livestock unit under the new CAP) exist for animal genetic resources, while at best only ad hoc support schemes exist for landraces, the EU as a whole, as well as national policymakers, urgently need to explore mechanisms through the CAP to systematically support the on-farm conservation of Europe's agricultural heritage of landrace/traditional varieties of wheat and other crops.

¹⁴ Narloch, U., Drucker, A.G. and Pascual, U. 2011. Payments for agrobiodiversity conservation services (PACS) for sustained on-farm utilization of plant and animal genetic resources. Ecological Economics 70(11):1837-1845. ²⁰ Drucker, A. and Ramirez, M. 2020. <u>Payments for Agrobiodiversity Conservation Services</u>: An Overview of Latin American experiences, Lessons Learned and Upscaling Challenges. Land Use Policy: 99

¹⁵ Narloch, U., Pascual, U. and Drucker, A.G. 2013. How to achieve fairness in payments for ecosystem services? Insights from agrobiodiversity conservation auctions. Land Use Policy 35:107-118.

5.0 Conclusions on Effectiveness of In Situ Support Mechanism

In the Results Section 2.2 (p.8) of this report we note that: Expert opinion plays a key role in the inclusion of specific landraces on threat lists, in part due to the lack of data for potential indicators (e.g. variety/cultivar areas and farmer numbers) and the lack of a widely accepted threat assessment criteria and mechanism. No recognition of differing threat levels is used to determine support payments in any of the sample countries. There are a range of institutional arrangements, with the Alpine countries. (Austria and Switzerland) having large formal annual direct support programmes; while relatively less wealthy but higher diversity countries such as Greece have had more modest and temporary ones. By contrast, Hungary and the UK have no direct support programmes at all. This contrasts with the widespread support for threatened animal genetic resources under the CAP. Support payments for wheat landraces, where they exist, were in the range of 120-251/ha. Relatively little of the total existing support, even in those countries with large programmes, is focussed specifically on wheat landraces (Austria 1.2% and Greece 8.3%).

When this is read in conjunction with Section 4 (Conclusions and Recommendations) on p.12 which also takes into account the results of the farmer survey (Section 3) and the general public survey (Report D3.2), we have noted that "Estimated conservation costs ($\leq 1.8m - \leq 33m$ p.a.) are well within the general public's willingness to pay ($\leq 80.2m$ p.a.)" and that there is thus "potential to better align agrobiodiversity conservation funding with EU citizens' preferences for the conservation of agricultural diversity." Furthermore, that "Current support levels—ranging between ≤ 120 and $\leq 251/ha$.), where they exist at all—are on average below levels stated by farmers as necessary to cover their opportunity costs ($\leq 300 - \leq 550/ha$)" – which might reasonably be considered to explain the less than ideal status of landrace diversity in Europe, as reported in some of the other Farmer's Pride reports [see D2.2 Part 2]. Report D3.1 goes on to conclude improved cost-effectiveness could be achieved through a differentiated payments approach (e.g. though the use of competitive conservation tenders), with the savings relative to the current uniform payments approach potentially being significant (21-60%).

Therefore, assessing the effectiveness of *in situ* support mechanisms is challenging as there is a lack of data related to potential performance indicators (such as areas under threatened landrace cultivation, number of farmers involved, spatial configuration, seed access and exchange). However what we can say is that threat levels are not taken into account in assigning support, some countries have no support programmes at all (so by definition, ineffective), current support payments where they exist at all are on average below farmer stated opportunity costs, support could be more costeffectively applied through a differentiated payments approach given the heterogeneity in farmer opportunity costs (and presumably threat levels) and overall support levels are not aligned with EU citizens' stated preferences.

Appendix I: Full Survey Results of Existing Incentive Mechanism Desk Review/Expert Consultation

AUSTRIA

1. Briefly describe the general situation regarding the existence, status (population size) and trends of landraces/traditional varieties in your country. Include specific mention of the wheat landraces/traditional varieties that are part of your study.

The most cultivated landraces are all listed for support under the agro-environmental programme ÖPUL (second pillar of the CAP). Yearly data from the Austrian Ministry show how many farmers participate, which varieties and which areas are cultivated and the level of subsidies that are paid to the farmers. Arche Noah obtained this data from the period 2007 to 2017. The data from the years 2007, 2010, 2014 and 2017 were analysed.

There are also landrace varieties under cultivation that are not in this list; they will be addressed in WP1 (identification of hotspots for landraces).

The current agro-environmental programme ÖPUL 2015 (2015-2020) supports the production of rare agricultural crops with the measure "*Anbau seltener landwirtschaftlicher Kulturpflanzen* (*SLK*)" (cultivation of rare agricultural crops). Twenty-four species and 75 varieties are listed for the programme: 47 varieties of grain, corn and sorghum; 8 varieties of buckwheat and leguminous crops, 5 varieties of potatoes and root crops, 7 varieties of oil and fibre plants and 8 varieties of vegetable crops. The exact list is provided in the Appendix A.

The premium is €200/ha for corn, potatoes and vegetables, for all other species the premium is €120/ha.

The conditions for the participation in the programme are:

- No mixtures of cultivars
- At least 0.1 ha
- Not more than 10 ha per cultivar
- At maximum for 2 % of the total agricultural area

(BIO AUSTRIA 2016)

From 2010 to 2017, the number of participating farms, total areas and total of premiums increased. In 2014, there was a decline because of the transition from one programming period to the other (Table 1).

Table 1. Development of number of farms, total area and premiums between 2010 and 2017 (own data)

Year	Number of farms	Total area (ha)	Total of premiums (€)
2010	3323	12088.0	1.571.787
2014	2463	8929.0	1.156.437
2017	3595	14350.;2	1.715.726

Figure 1 shows the development of the supported area for each federal state. In the Eastern federal states (Niederöstereich, Oberösterreich, Burgenland), much greater areas are supported than in the Western and Southern federal states. The reasons are the larger area of agricultural land in the East of the country and the increased participation of specialized agricultural farms.



Figure 1. Supported area of ÖPUL-Programme "SLK" for the years 2010, 2014 and 2017, grouped in federal states (B = Burgenland, K = Kärnten, NÖ = Niederösterreich, OÖ = Oberösterreich, S = Salzburg, STMK = Steiermark, T = Tirol, V = Vorarlberg, W = Wien) (own data)



Figure 2. Supported area for all listed crops in 2010 and 2017 and percentage of supported area compared to area in total (own data)

Figure 2 shows the supported area for all listed varieties and the percentage compared to the total cultivated area of the respective species. Spelt, poppy and emmer have the highest shares of supported area. In opposite, the share of supported area is very low in wheat, oat, barley,

corn and potato (0 - 0.5 %). In 2017, 9.000 ha of spelt were supported, 2.000 ha of Emmer and Einkorn, 2.000 ha of poppy, 1.000 ha of buckwheat and 1.000 ha of rye.

- 2. Does your country maintain a list of threatened landraces/traditional varieties?
- 3. If so, what are the criteria for being included on such a list and how has it evolved over the years? Are there minimum areas or famer numbers that are used to determine whether a landrace/traditional variety is at risk or not? Are different levels of threat recognised?

The varieties that are supported by the ÖPUL-programme (SLK measure) are shown in Appendix A. Detailed information about the single varieties can are listed in AGES (2019).

There is a second list of conservation varieties that is published each year (BAES, 2019).

The two lists are partially overlapping but only the varieties of the SLK-list are supported by the ÖPUL-programme.

The SLK-list has been established by a Brain Trust headed by The Austrian Agency for Health and Food Safety (AGES) and the Ministry for agriculture, forestry, environment and water supply and distribution (BMLFUW). For each period, the list is revised taking account experience from previous agro-environmental-programmes. Criteria for inclusion on the list are that the varieties are of Austrian origin, that they are at risk (no minimum areas, just decided from experience) and that they have some regional value. All farmers and farmers' organisations are eligible to submit proposals to the Brain Trust during specific periods.

4. For wheat landraces/traditional varieties does data exist with regard to areas cultivated and farmer numbers?

There is data that only applies to the supported areas. One important variety, 'Laufener Landweizen' was included on the list in 2019.

Figure 3 shows the area planted with supported wheat landrace varieties in the years 2007, 2010, 2013 and 2017. Only *"Loosdorfer Bankut Grannen"* was produced to a larger extent in 2007 and 2010, after which its production declined drastically. The areas planted to other wheat landraces were either stable or in decline. One variety, *"Rosso"* increased between 2013 to 2017. On the whole, the area planted to wheat landraces decreased to 173ha in 2017 and, overall, 47 farms cultivated the supported wheat landraces in 2017.

Information about the distribution among the federal states is given for 2017 (Figure 4). In 2017, five wheat varieties were supported by the SLK measure (Table 2). Some varieties are cultivated in different regions, not only in the region of origin.

Table 2. Area and farm number of supported wheat varieties in 2017 (own data)					
Variety	Area (ha)	Number of farms			
ATTERGAUER BARTWEIZEN	5,3	1			
KÄRNTNER FRÜHER	37,7	22			
LOOSDORFER AUSTRO BANKUT GRANNEN	49,3	11			
ROSSO	74,8	9			
RUBIN	6,3	4			

Table 2: Area and farm number of supported wheat varieties in 2017 (own data)

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Figure 3. Area of supported wheat varieties in the years 2007, 2010, 2013 and 2017 (own data)



Figure 4. Distribution of wheat landraces among federal states (2017) (own data)

5. For farmers cultivating threatened landraces/traditional varieties, what types of support mechanisms exist? (e.g. specialised extension services, support for seed access, support for establishment of back gardens/orchards, support for marketing, subsidised inputs, direct support payments, etc.)

The main support is provided by direct support payments, which are described in Question 1 (SLK measure of agri-environmental programme ÖPUL).

In addition, the federal state of Tirol has developed a specific programme "Alte Tiroler Getreidesorten" to support traditional Tirolian varieties. The "Tiroler Umweltanwaltschaft" offers help to participating farms regarding access to seeds and regarding commercial partners, and organizes annual networking and education meetings. In 2018, 29 farms participated with in total 7,65 ha (Tiroler Umweltanwaltschaft 2019).

6. If direct support payments exist, how are they determined? (e.g. how much is paid per hectare or per variety p.a.). Describe the programmes in detail (when they started, which landraces/traditional varieties are eligible, participation conditions/requirements, how many people participate [with gender and age breakdown, if possible], etc. What challenges have they faced? What kind of impacts have they had?

General information about the programme: see the response to Question 1 The programme was started in 1990.

There is no data about gender and age of participants.

The impact of the direct support payment was clearly an increase in the cultivation of several species (spelt, Emmer and Einkorn wheat, poppy). The cultivation of traditional varieties of rye, barley, wheat and oat could not be promoted, but probably helped to maintain a certain threshold of area for some of the listed varieties. Some varieties are nonetheless at risk of extinction on Austrian farms.

7. How much is spent on direct support payments for the wheat landraces/traditional varieties in question?

Around €20.000 was spent in 2017.

References

AGES (2019): Österreichische Agentur für Gesundheit und Ernährungssicherheit: <u>http://slk.ages.at/slk-sortenliste-beschreibungen-saatgutbezug/</u>

BAES (2019): Bundesamt für Ernährungssicherheit: <u>https://www.baes.gv.at/zulassung/pflanzensorten/oesterreichische-sortenliste/</u>

BIO AUSTRIA (2016): Österreichisches Programm für umweltgerechte Landwirtschaft ÖPUL 2015–2020: <u>https://www.bio-austria.at/app/uploads/BIO-AUSTRIA_OEPUL_Fachinfo.pdf</u>

Tiroler Umweltanwaltschaft:

http://www.tirolerumweltanwaltschaft.gv.at/naturschutz/naturprojekte/alte-tirolergetreidessorten

ANNEX (AUSTRIA)

٩.	GETREIDE, HIRSE und MAIS		•	Mais (Zea mays):	
	Winter-(Secale cereale) und Bergroggen (Ser tum); Chrysanth Hanserroggen Jaufenthaler Johannisroggen/Waldstaudenroggen (alle Herkünfte und Sorten) Kaltenberger Kämtner Lindorfer Roggen Lungauer Tauern 2 Oberkämtner	(A) (A) (A) (A) (A) (A) (A) (A) (A) (A)	B. HI	Alter Roter Hausmais Galitaler Weißmais Gleisdorfer Edelmais Kematener Knillis Landmais Pitztaler Gelb Vorarlberger Riebelmais BUCHWEIZEN, LEGUMINOSEN, JLSENFRÜCHTE, ERDÄPFEL und TOPPELRÜBE	(B) (B) (B) (B) (B) (B)
	Pölstaler Winterroggen Schlägler Tschermaks Veredelter Marchfelder	(A) (A) (A)	•	Buchweizen (Faqopyrum esculentum): Anita Bamby	(A) (A)
	Winterweizen (Triticum aestivum): Attergauer Bartweizen Laufener Landweizen	(A)		Billy Kärntner Hadn Pvra	(A) (A) (A)
	(/	A)Loosdor		Rotklee (Trifolium pratense)	(· ·)
	fer Austro Bankut Grannen Marienhofer Kolben Rinner Winterweizen	(A) (A) (A)	•	Steirerklee (Erhaltungssorte) Schabziegerklee (Trigonella caerulea):	(A)
	Ritzlhofer Rosso Sipbachzeller	(A) (A) (A)	•	(alle Herkünfte und Sorten) Buschbohne (Phaseolus vulgaris):	(A)
	Verbesserter St. Johanner	(A)		Rotholzer	(D)
	Winterdinkel (Triticum spelta): Attergauer Dinkel Ebners Rotkom Ostro Steiners Roter Tiroler	(A) (A) (A)	•	<u>Erdapfel (Solanum tuberosum):</u> Ackersegen Goldsegen Linzer Delikatess Linzer Rose	(B) (B) (B) (B)
	Sommergerste (Hordeum vulgare); Tiroler Imperial (Fisser Gerste) Sechszeilige Pumper	(A) (A)		Naglerner Kipfler Mehlige Mühlviertler Pinki Stoppelnibe (Brassica rapa subsp. rapa):	(B) (B) (B)
	Sommerroquen (Secale cereale): St. Leonharder Tirolar	(A) (A)	c.	Stoppelrübe (alle Herkünfte und Sorten) (E ÖL- und FASERPFLANZEN	5)
	Sommerweizen (Triticum aestivum): Kärntner Früher	(A)	•	Lein (Linum usitatissimum): Ötztaler	(A)
	Rubin Tiroler Begrannter Binkel Tiroler Früher Binkel Tiroler Mittelfrüher Binkel	(A) (A) (A)	•	Calena Mohn (Papaver somniferum):	(A)
	Hafer (Avena sativa) und Nackthafer (Avena n Fahnenhafer (alle Herkünfte und Sorten) (/ Nackthafer (alle Herkünfte und Sorten) (/ Obernberger Schwarzhafer	(1.7 A) A) (A)		Edel-Weiß Florian Waldviertler Graumohn Weißsamiger Mohn	(A) (A) (A) (A)
	Einkorn (Triticum monococcum) und Emmer (dicoccum): Einkorn (alle Herkünfte und Sorten)	Triticum (A)	•	Zwiebel (Allium cepa), Schalotte (Allium ascalo Gelbe Laaer	(B)
	Emmer (alle Herkünfte und Sorten) Sorghum (Sorghum bicolor), Kolbenhirse (Set und Rispenhirse (Panicum miliaceum): Kornberger Körnersirk	(A) aria italica (A)		Laaer Rosa Lotte Rote Laaer Schneeweiße Unterstinkenbrunner Schoderleer Steckzwiebel Tundra	(B) (B) (B) (B)
	Pipsi Tiroler Rispenhirse	(A) (A)		Wiener Bronzekugel	(B)

Anhang F Sortenliste für die Maßnahme "Anbau seltener landwirt- (3) schaftlicher Kulturpflanzen" (04)

GREECE

1. Briefly describe the general situation regarding the existence, status (population size) and trends of landraces/traditional varieties in your country. Include specific mention of the wheat landraces/traditional varieties that are part of your study.

Most wild species of wide distribution are not facing immediate threat of genetic erosion or extinction (cereals, forages, pulses, aromatic-medicinal plants). However, the danger for certain categories is great and the threat of extinction is a reality. For example, some species, which are grown on a limited number of suitable coastal sites, now face the pressure of the development of tourism. Among the threatened species are also certain unique aromatic and medicinal plants of the country due to their excessive overexploitation, putting at risk the limited natural populations.

With the advent of the modern market-oriented agriculture, Greece has suffered dramatic losses in its cultivated germplasm, which was displaced by superior modern varieties produced by the local breeding institutes or was imported from abroad. The erosion was particularly intense and rapid in cultivated cereals, where the local populations and varieties cultivated today hardly account for 1% of the total allocated acreage. An analogues trend, but with a 15-20 years' delay comparatively to the cereals, is now becoming apparent for vegetable crops, where in recent years Farmer's Pride: Effectiveness of existing levels of *in situ* support for landrace conservation and use in Europe Page **20** of **29** local landraces are rapidly displaced even from backyard gardens. Traditional varieties are still used in many tree crops and in the grapevine. However, the number of varieties used on a large scale has been substantially reduced. The main reason for this genetic erosion was the unquestionable superiority of the modern varieties over their traditional counterparts, their suitability for intense farming systems and their conformity to the demands of the market. Consequently, the success of scientific genetics and breeding indirectly and unintentionally led to a depletion of the existing global biodiversity, mainly because even the scientific community had failed to foresee the adverse effects of modern farming and seed production and trade rules on biodiversity and failed to take timely action (Stavropoulos, 1996). Up to the end of the 1970s the dramatic depletion of PGR occurring in Greece was not fully appreciated. Persistent efforts were made (FAO, ECPGR, researchers, NGOs, etc.) to raise first the scientific and then the political and public awareness, as early as in the 1970s, so that today genetic erosion is recognised as a major issue, not only in scientific or political circles but even by common people. National legislation provided a generalized protection of the environment and biodiversity but without targeting on species of broad agricultural interest. In the framework of the Regulation 1257/99 a few agroenvironmental projects were carried out funded by the National Rural Development Plan and the Operational Programme Construction of the Rural Development-Reconstruction of Countryside 2000-2006.

The combination of a favourable natural environment and the agricultural practices of selfsufficiency, in the beginning of the 20th century, have led to the maintenance of a large number of landraces that are well adapted to the local conditions (Stavropoulos, et al., 2006).

2. Does your country maintain a list of threatened landraces/traditional varieties?

Greece maintains a list of landraces under threatened from genetic erosion first developed in 2005-2006 and updated twice since then, in 2011 and in 2015. The list includes species originated or diversified in Greece (leguminous crops such as *Lens, Vicia* and *Lathyrus*, trees such as *Olea, Ficus* and *Vitis*), species introduced in Greece centuries ago that later evolved and adapted to the local conditions (many fruit trees such as *Malus, Pyrus, Prunus*, cereals such as *Triticum, Hordeum, Secale* and vegetables such as *Phaseolus, Solanum, Capsicum*).

3. If so, what are the criteria for being included on such a list and how has it evolved over the years? Are there minimum areas or famer numbers that are used to determine whether a landrace/traditional variety is at risk or not? Are different levels of threat recognised?

The list was produced in 2005-2006 after consultations of experts from the Ministry of Rural Development and Food, Directorates of Agricultural Economy of the various prefectures, Universities, research institutes, local rural services, NGOs, etc., with focus on old Greek cultivars reduced or extinguished from cultivation and threatened by genetic erosion. The list was prepared in view of the implementation of Measure 3.8 of Axis 3 "Agro-environment measures" of the Rural Development Programme 2000-2006 following the implementation of the Common Ministerial Decision 620/135644/06-07-2005 (Ministerial Decision 218151/23-06-2006, Governmental Gazette 823/4-7-2006). The landraces registered into the catalogue were funded under Measure 3.8 for the conservation of extensive crops threatened by genetic erosion. The measure for the conservation of plant genetic resources in Greece started in 2007 and lasted five years.

The list contains information regarding the areas of Greece where the landraces were cultivated, the current ha of cultivation and the target ha for each landrace were also mentioned. The list has since been updated twice, in 2011 and in 2015, while measures expected to take effect have not yet been implemented.

Different levels of threat were not recognized.

4. For wheat landraces/traditional varieties does data exist with regard to areas cultivated and farmer numbers?

There are official data from the Ministry of Rural Development and Food for the landraces cultivated and supported under specific measures, e.g. data for the areas (Figure 5) and number of farmers cultivating wheat landraces/traditional varieties under Measure 3.8 as follows: 57 farmers from 13 different regional units of Greece received payments for the cultivation of durum and bread wheat, Einkorn, oat, rye and barley species, in specific areas and covering 167 hectares (see Figure 5).

Other official (or detailed) data are not available because the farmers have to declare the species they cultivate and the area and not the specific variety (especially when the specific variety is not included in the list of cultivated species).

Data from the archive of the Greek genebank and other institutions involved in the collection of landraces or data from the archives of NGOs (e.g. AEGILOPS) are available.



Figure 5: Supported area for all landraces (total), all cereal landraces, wheat landraces and the wheat landraces in question (Limnos, Kaploutzas and Skylopetra) cultivated under Measure 3.8.

5. For farmers cultivating threatened landraces/traditional varieties, what types of support mechanisms exist? (e.g. specialised extension services, support for seed access, support for establishment of back gardens/orchards, support for marketing, subsidised inputs, direct support payments, etc.)

In the framework of the Agro-environmental Measure that was implemented in Greece for the conservation of plant genetic resources threatened by genetic erosion. That started in 2007 and lasted five years, direct support payments were given to farmers who were cultivating landraces (specific varieties from a list) at specific areas of Greece and at specific hectares. A similar project will take place again but probably not earlier than 2021. The payments for wheat landraces ranged from \pounds 251ha/year for on-farm conservation to \pounds 600/ha/year for on-farm conservation and regeneration. The higher payments for some landraces (such as fruit trees) were \pounds 900/ha/year.

The project aimed to maintain agricultural biodiversity, to promote the sustainable management of plant genetic resources and to enhance the cultivation of local varieties and the on-farm conservation of a wide range of crops through farmers. It was started in 2007 and finished in 2011. During this project 271 farmers from 21 different regional units of Greece received payments from the Ministry of Rural Development and Food for the cultivation of 38 landraces (mostly landraces of cereals, legumes, vegetables and fruit trees) from a specific list.

In recent years, steps have been made for the registration of landraces in the country's Catalogue of Conservation Varieties according to the EC Recommendation 2008/62/EU of the 20 June 2008 (L 162)". To date, only two landraces (Thespion onion and Chondrokatsari tomato) have been accepted for registration in the Catalogue, but many other requests are in the process of being approved.

6. If direct support payments exist, how are they determined? (e.g. how much is paid per hectare or per variety p.a.). Describe the programmes in detail (when they started, which landraces/traditional varieties are eligible, participation conditions/requirements, how many people participate [with gender and age breakdown, if possible], etc. What challenges have they faced? What kind of impacts have they had?

The support provided under Measure 3.8 varied between €251–€900/ha/year depending on the landrace (annual cultivations or fruit trees) and also on the farmer's intension to conserve the landrace or to conserve and also regenerate it. The project started in 2005 and lasted five years. Eligible landraces/varieties were those which were not registered in the national catalogue. A few varieties from the national catalogue, which had developed from landraces and had lost their property rights, were also eligible. About 30% of the farmers were women. Some of the challenges they faced included: not having enough seeds to cultivate a landrace; the Greek Genebank could offer only a small proportion of seeds; and the bureaucracy was another challenge for most of them.

7. How much is spent on direct support payments for the wheat landraces/traditional varieties in question?

From the €259.000 distributed in support payments under measure 3.8 (Figure 6), €75.000 were provided for cereal landraces, €21,400 for wheat landraces and only €9,000 were given for the wheat landraces in question (Skylopetra, Limnos and Kaploutzas) (Fig. 6).



Figure 6: Support given for all landraces (total), all cereal landraces, wheat landraces and the wheat landraces in question (Limnos, Kaploutzas and Skylopetra) cultivated under Measure 3.8.

References:

Stavropoulos, N. 1996. Greece: Country report to the F.A.O. International Technical Conference on Plant Genetic Resources. Liepzig, 17-23 June.

Stavropoulos, N., Gogkas, D. Chatziathanassiou, A., Zagilis, E., Drakopoulos, G., Paitaridou, D., Trigas P., Thanopoulos, R., Koutsomitros, S., Perdikaris, A., Lourida, B. and Alesta, A. 2006. Greece:

Second Country Report concerning the state on plant genetic resources for food and agriculture. Hellenic Democracy, Ministry of Rural Development and Food, Athens.

HUNGARY

1. Briefly describe the general situation regarding the existence, status (population size) and trends of landraces/traditional varieties in your country. Include specific mention of the wheat landraces/traditional varieties that are part of your study.

The procedure for the recognition of landraces in Hungary is regulated by three ministerial-level implementing decrees: 1) Decree of the Ministry of Agriculture and Rural Development 104/2009 (VIII. 5.) on the state recognition of landraces and conditions for the production and marketing of their seeds; 2) Decree 27/2012 (III. 24.) of the Ministry of Agriculture on the state recognition of fruit landraces and the conditions for the production and marketing of their propagating material; and 3) and decree 65/2011 (VII. 11.) of the Ministry of Agriculture on the recognition of landraces and obsolete varieties of vegetable plant species and on the conditions for the production and marketing of their seeds. VM decree.

Among the field crops in Hungary, one maize variety (Homoki white dent corn) was recognized in 2019.

Regarding vegetables, a total of 13 landraces have received state recognition (are registered) as follows: two varieties of garlic (Makó spring and Bátyai autumn), one head cabbage (Hadházi flat), one pepper (Bogyiszlói), seven tomatoes (including Pákozdi, Ceglédi yellow, Faddi, Tolna, Gyöngyösi, Máriapócsi) and two beans (Regölyi indás and Regölyi menyecskebab).

As for fruit species, a total of 66 fruit landraces have been recognized and registered (31 apple, 9 pear, 5 cherry, 13 plum, 1 blackthorn, 3 apricot, 4 peach landraces).

In Hungary, landraces are basically found in gene banks and are planted in hobby gardens. There is no market production of landraces/traditional varieties. Regarding the tendency of landrace registration, most were registered in the early 2010s; since 2015 new ones are only registered occasionally.

There is no recognized/registered wheat landrace in Hungary.

2. Does your country maintain a list of threatened landraces/traditional varieties?

In Hungary, the registered landraces are included in the National Variety List, however, there is no separate list of threatened landraces/traditional varieties, nor does a "threatened" category exist.

3. If so, what are the criteria for being included on such a list and how has it evolved over the years? Are there minimum areas or famer numbers that are used to determine whether a landrace/traditional variety is at risk or not? Are different levels of threat recognised?

N/A

4. For wheat landraces/traditional varieties does data exist with regard to areas cultivated and farmer numbers?

N/A

5. For farmers cultivating threatened landraces/traditional varieties, what types of support mechanisms exist? (e.g. specialised extension services, support for seed access, support for establishment of back gardens/orchards, support for marketing, subsidised inputs, direct support payments, etc.)

Landraces are typically used by hobby gardeners or preserved in gene banks, they are of negligible importance in marketing/production, and accordingly there is no support for traditional varieties.

6. If direct support payments exist, how are they determined? (e.g. how much is paid per hectare or per variety p.a.). Describe the programmes in detail (when they started, which landraces/traditional varieties are eligible, participation conditions/requirements, how many people participate [with gender and age breakdown, if possible], etc. What challenges have they faced? What kind of impacts have they had?

N/A

7. How much is spent on direct support payments for the wheat landraces/traditional varieties in question?

As there are no wheat landraces, no support can be claimed.

SWITZERLAND

1. Briefly describe the general situation regarding the existence, status (population size) and trends of landraces/traditional varieties in your country. Include specific mention of the wheat landraces/traditional varieties that are part of your study.

In Switzerland, the conservation and management of plant genetic resources is conducted by way of a public–private partnership and coordinated by the Ministry of Agriculture. Switzerland implemented the National Action Plan for Plant Genetic Resources for Food and Agriculture (NAPPGREL) based on the Global Action Plan for PGRFA in 1999. The conservation community is organized in a network called the Swiss Commission for the Conservation of Cultivated Plants (43 members). The network has a legal status as an association based in Bern (https://www.cpcskek.ch/der-skek-verein.html). Since its existence, over 400 different projects have been realized

(https://www.blw.admin.ch/blw/de/home/nachhaltige-

produktion/pflanzlicheproduktion/pflanzengenetische-ressourcen.html). These activities have been legally implemented and described in the January 2016directive 916.181 PGRELV based on the law of agriculture article 147a and 147b and 177 (1998 LwG).

Since 1999 the NAP for PGRFA has described Switzerland's pathway towards the safeguard and long-term-conservation of its PGRFA. Different articles of the directive points include:

- How the access to PGRFA is regulated
- Which PGRFA are maintained

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- What are the measures that have been undertaken for the sustainable use and conservation of PGRFA in Switzerland (including in situ/on farm and ex situ measures)
- Which projects are supported and how stakeholders can apply for financial support
- How information are stored in the national information system (https://www.pgrel.admin.ch/pgrel/#) are described.

2. Does your country maintain a list of threatened landraces/traditional varieties?

All accessions officially maintained in Switzerland are compiled in the "National positive list". Today 1584 cereals, 74 industrial plants (fibre, oil, etc.) and 311 maize accession are maintained, as well as 671 vegetables, 55 potatoes, 283 berries, 367 fodder plants, 3323 fruits, 153 vineaccessions and 168 medicinal plant accessions.

These figure change over time as new findings from the inventories or description projects are integrated in the decision making process and step by step "new" accessions are integrated in the positive list (see description below – introduction collection point 3).

The national conservation programme supports 69 different collections located throughout Switzerland. These collections are coordinated mostly by private organization (NGOs and agricultural research institutions). For CWR (mostly fodder plants) around 200 sites are defined and maintained.

https://www.pgrel.admin.ch/pgrel/#/culture/1/conservation/accession/detail/description

3. If so, what are the criteria for being included on such a list and how has it evolved over the years? Are there minimum areas or famer numbers that are used to determine whether a landrace/traditional variety is at risk or not? Are different levels of threat recognised?

The Swiss Commission for the Conservation of Cultivated Plants (see above) uses defined criteria to decide which plants have to be included in the national collection and which not. In the Commission, ten different working groups are defined and they suggest which varieties have to be accepted. Decisions are taken on the basis of expert knowledge and not statistic data (because they are not available).

The conservation programme started with countrywide inventories on farm and in literature. All PGR that of Swiss provenance are collected and maintained in introduction-collections until the varieties or landraces have been described and defined. For fruits this process can take many years and, in the case that descriptions do not prove differences, molecular markers are used for the definition of an accession. Every accession that is unique and does not hold any similarity to others is maintained for long-term conservation in primary collections or duplicate collections.

There are no minimum areas or numbers of farmers etc. used to determine risk. For fruits, the number of trees or quantity (weight) of a variety still produced are used to determine risk. If the number drops below a certain threshold the fruit variety is put on the "positive list". But for landraces, no such indicators are available. A variety is saved if it is conserved or maintained in about 3 different conservation orchards (at least four trees/accession).

Different levels of threat are not recognised. But experts know if a variety is still known in another country or not. If this is the case, Switzerland can still decide to integrate this variety into its conservation system if this variety has a cultural value or was an important variety for a specific region.

4. For wheat landraces/traditional varieties does data exist with regard to areas cultivated and farmer numbers?

The most recent list provides 16 addresses of institutions and networks for cereals. The network partners know the partners they work with. There are no addresses of private stakeholders (farmers) published.

5. For farmers cultivating threatened landraces/traditional varieties, what types of support mechanisms exist? (e.g. specialised extension services, support for seed access, support for establishment of back gardens/orchards, support for marketing, subsidised inputs, direct support payments, etc.)

There is a programme for the propagation of gene bank material where different partners of the Commission network (crop – working group) are involved, and they receive financial support for their work. is the amount for every crop species is defined year by year. There is no support for marketing activities. The NAP programme provides support for the improvement of old varieties and breeding projects for niche-varieties (special or neglected crops).

6. If direct support payments exist, how are they determined? (e.g. how much is paid per hectare or per variety p.a.). Describe the programmes in detail (when they started, which landraces/traditional varieties are eligible, participation conditions/requirements, how many people participate [with gender and age breakdown, if possible], etc. What challenges have they faced? What kind of impacts have they had?

For conservation activities CHF3.2m are provided for all crops.

For sustainable use activities another CHF1.6m are available.

All landraces/obsolete varieties or traditional varieties that are on Switzerland's "positive list" are eligible (see answers above).

- 7. How much is spent on direct support payments for the wheat landraces/traditional varieties in question?
 - For all eligible crops see above.
 - In Switzerland the gene bank based in Changins (VD) is specialized in wheat and the money they need to propagate cereals for themselves is not part of the NAP.
 - As support payment is always for a four-year phase, the amount can vary considerably from phase to phase, especially for crops that are propagated by seeds.

UNITED KINGDOM

1. Briefly describe the general situation regarding the existence, status (population size) and trends of landraces/traditional varieties in your country. Include specific mention of the wheat landraces/traditional varieties that are part of your study.

The general situation regarding the existence, status (population size) and trends of landraces/traditional varieties in the UK is that there are still significant landrace resources in cereals, vegetables, fruits and forages in the UK, but population sizes are decreasing overall. For example, a recent review by Shoemark and Maxted (unpublished) of landraces in the Scottish Islands found, between 2003 and 2018, a reduction in population numbers in Orkney of 31.5%, Shetland of 42.8% and Western Isles 21%. There is no specific information on the loss of wheat landraces, but it seems logical that it would be of comparable level.

- 2. Does your country maintain a list of threatened landraces/traditional varieties? No
- 3. If so, what are the criteria for being included on such a list and how has it evolved over the years? Are there minimum areas or famer numbers that are used to determine whether a landrace/traditional variety is at risk or not? Are different levels of threat recognised? N/A
- 4. For wheat landraces/traditional varieties does data exist with regard to areas cultivated and farmer numbers? No
- 5. For farmers cultivating threatened landraces/traditional varieties, what types of support mechanisms exist? (e.g. specialised extension services, support for seed access, support for establishment of back gardens/orchards, support for marketing, subsidised inputs, direct support payments, etc.)

There is currently no specific support for landrace maintenance, but farmers may inadvertently gain support by general environmental stewardship scheme.

- 6. If direct support payments exist, how are they determined? (e.g. how much is paid per hectare or per variety p.a.). Describe the programmes in detail (when they started, which landraces/traditional varieties are eligible, participation conditions/requirements, how many people participate [with gender and age breakdown, if possible], etc. What challenges have they faced? What kind of impacts have they had? N/A
- 7. How much is spent on direct support payments for the wheat landraces/traditional varieties in question? Nothing.