



## POLICY BRIEF No. 59

# Getting incentives right?

## Support mechanisms for effective conservation and use of landraces in Europe and public willingness-to-pay

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## Public willingness-to-pay (WTP) for wheat landrace conservation

To determine the general public's WTP for landrace conservation and to inform decision making regarding the allocation of public funds to support crop diversity conservation, 801 adult respondents residing across five EU countries<sup>1</sup> were interviewed in person using a stated preference choice experiment<sup>2</sup> to elicit the value that the general public places on conserving crop genetic resources, using traditional wheat landraces as a case study. The response data collected were analysed using random parameter logit (RPL) models, which permit the robust analysis of preference parameters that vary between individuals and across countries.

Four conservation program attributes as well as program cost were applied to: i) insure against the risk of agricultural production loss; ii) ensure the maintenance of landscape and ecological values, (iii) ensure protection of wheat landrace diversity, and (iv) ensure the maintenance of traditional knowledge and cultural practices (including aspects of food culture).

<sup>1</sup> Austria [n=100], Greece [n=200], Hungary [n=200], Switzerland [n=101] and the U.K. [n=200].

<sup>2</sup> Stated preference choice experiments are a quantitative technique for eliciting preferences in the absence of revealed preference data (such as market prices). The method involves asking individuals to state their preference regarding alternative scenarios, where each alternative is described by several attributes. Responses are used to determine the degree to which preferences are influenced by the attributes and also their relative importance (Mangham et al., 2009).

## Executive summary

Agricultural biodiversity (or agrobiodiversity) is associated with a range of important but poorly quantified public good ecosystem services, the conservation of which requires public support. This policy brief reports the results of a survey—conducted as part of the EU Horizon 2020 project “Farmer’s Pride”—designed to determine the general public’s willingness-to-pay (WTP) for wheat landrace conservation in Europe (demand side), as well as a survey designed to assess the willingness of wheat farmers to participate in on-farm conservation of wheat landraces (supply side). Policy recommendations are elaborated based on these findings.

A full description of the attributes and their levels/degree to which they apply (selected in consultation with genetic resources and agricultural experts) can be found in Drucker et al. (2021a, Annex I)<sup>3</sup>. The survey was designed so that each of the four attributes represents a component of the total economic value (TEV) of the genetic resource being evaluated, such that the sum of the separate attribute values may be used as an estimate of the TEV of the public good ecosystem services associated with the maintenance of wheat landrace diversity in farmers' fields.

Survey results reveal strong support for the conservation of wheat landrace diversity, with average WTP amounting to just over €95 (as a one-time only donation) per respondent (see Table 1). In particular, strong preferences were revealed for the landscape and ecological values of wheat conservation, which are associated with the presence of landraces in nature (*in situ*) through on-farm conservation. We find, however, important differences between countries (see Drucker et al., 2021a, p. 7)<sup>3</sup>, particularly in terms of preferences for avoiding high risk of agricultural production losses and for the number of wheat varieties maintained.

**Table 1.** Mean individual and aggregate WTP for conservation program attributes.

Respondents' WTP in order to:	Pooled sample (household estimates) indicating one-time only donations	Aggregate estimates <sup>4</sup>	Conservative (10%) estimate
Avoid high risk of agricultural production loss	€30.94	€3.2 billion	€323 million
Maintain/Improve landscape & ecological values	€34.09	€3.6 billion	€356 million
Support cultural aspects	€3.04	€320 million	€32 million
Maintain 100% of current existing diversity for the future/future generations	€27.30	€2.9 billion	€290 million
<b>Total Economic Value</b>	<b>€95.37</b>	<b>€10 billion</b>	<b>€1 billion</b>

Source: Farmer's Pride project survey

3 Drucker, A.G., Tyack, N., Bartha, B., Fehér, J., Krommydas, K., Maierhofer, H., Maxted, N. and Tzouramani, I. 2021a. 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. Available [here](#) from the Farmer's Pride project website.

4 Based on an aggregate five-country population estimate for 2019 of approximately 105 million, data from EUROSTAT.

With an average one-time only total WTP per respondent of €95.37 and a total population of slightly over 100 million across the five countries surveyed, we estimate that the general public of these five countries would be willing to pay €10 billion for the conservation of wheat landrace diversity alone. Even assuming that only 10% of those individuals would actually be willing to pay in practice (to counteract any hypothetical bias experienced in our survey), we would still obtain a one-time WTP of €1 billion, equivalent to approximately €80.2m per annum over a 20-year time horizon<sup>5</sup>. These findings demonstrate the significant and frequently-ignored social welfare benefits associated with non-market agrobiodiversity-related public good ecosystem services and provide a strong rationale for further government investment in on-farm conservation of landraces in Europe.

## Farmer's willingness to participate in wheat landrace conservation

Results from the farmers' survey (full details in Drucker et al., 2021b)<sup>6</sup> reveal that costs for the conservation of wheat landraces, although differing highly across the five countries, amount to an average cost of between €300–550/ha. Assuming that such costs are also representative of non-wheat landraces, together with an additional 20% for monitoring and administration costs, 1,000 landraces<sup>7</sup> covering a range of crops could be each conserved at five different sites<sup>8</sup> 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/yr) over

5 A standard 5% discount rate is used in order to permit future values to be expressed in terms of present value equivalents.

6 Drucker, A.G., Tyack, N., Bartha, B., Fehér, J., Koutis, K., Maierhofer, H., Maxted, N. and Ralli, P. 2021b. 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. Available [here](#) from the Farmer's Pride project website.

7 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. Austria estimated the existence of 3,000 landraces of which 75 (2.5%) are currently receiving support. Switzerland estimated it had a 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 (Drucker et al. 2021b). Thus, 1,000 landraces would represent ~5% of the current portfolio, which is significantly more than is currently supported.

8 Given the absence of widely recognized 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.



20 years<sup>9</sup>. 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 ecosystem services such as resilient landscapes and genetic flow/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 farmers<sup>10</sup> per landrace each with 1 hectare of land (= 50 ha/landrace) would cost ten times as much (€18m–€33m/year), but still compare favourably with the general public's demand for such conservation and their willingness to pay for it. This amount is also well within the planned European Union's (EU) Common Agricultural Policy (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/crop wild relative conservation.

## Incentive mechanisms desk review/expert consultation

The EU CAP is considered to be the critical public policy in terms of both impacts and funds dedicated to the conservation of biodiversity, including agrobiodiversity. Its second pillar, the Rural Development Policy measures – relating to “*environmental, climate and other management commitments*” – comprise a wide range of activities that are also particularly relevant to the conservation, sustainable use and development of genetic resources.

Under the current CAP, a range of institutional arrangements were identified through a desk review/expert consultation (see Drucker et al., 2021b, pp. 8–10). The Alpine (Austria, Switzerland) countries have large, formal programs that receive direct annual support, while relatively less-wealthy but higher-agrobiodiverse countries such as Greece have more modest and temporary schemes. By contrast, Hungary and the UK have no direct support programs at all. Support payments for cultivation of wheat landraces, where they exist, are in the range of €120–€251/ha, although relatively little of the existing support – even in those countries with large support programs – is focused specifically on wheat landraces (Austria 1.2% and Greece 8.3%). Expert opinion plays a key role in influencing the inclusion of specific landraces on threat

lists, in part due to the lack of data for systematic threat assessment (e.g. numbers of farmers and amount of land dedicated to cultivating specific landraces). This explains, in part, why recognition of differing threat levels plays no role in determining support payments in any of the five sample countries.

## Conclusions and policy recommendations

Estimated conservation costs (€1.8m–€33m/year) are well within the general public's WTP (€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 payment levels (€120–€251/ha) for the cultivation of wheat landraces, where they exist at all, are on average far below those stated by farmers as necessary to cover their opportunity costs (€300–€550/ha). Furthermore, given the large differences in the amounts farmers are willing to accept as compensation for participating in public good conservation activities – including across different landraces – the potential for improved cost-effectiveness to be achieved through the use of conservation tender mechanisms<sup>11</sup> for the payment of agrobiodiversity conservation services should urgently be explored. Savings relative to a uniform payments approach could be significant (21–60%), given that compensation under a tender mechanism can be tailored to cover differing individual farmer costs rather than compensating all farmers based on an average cost estimate.

Such a conservation tender mechanism approach, when implemented in conjunction with clear conservation performance targets (such as areas under threatened landrace cultivation, number of

9 A standard 5% discount rate is used in order to permit future values to be expressed in terms of present value equivalents.

10 Drawing on Drucker and Ramirez (2020, p.7), who model landrace conservation costs involving a minimum of 50–100 farmers. <https://doi.org/10.1016/j.landusepol.2020.104810>

11 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. <https://doi.org/10.1016/j.ecolecon.2011.05.018>

participating farmers, spatial configuration, seed access and exchange) as used in payments for ecosystem/ environmental services (PES)-based Payments for Agrobiodiversity Conservation Schemes (PACS) elsewhere<sup>12</sup>, could also contribute to the new EU CAP post-2020 proposals to shift the 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 aligns 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 per hectare, which is viewed as contributing to the inequitable impact of current CAP support payments. Further consideration of distributional/social-equity 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 succession<sup>13</sup>.

Given that formal support schemes exist for animal genetic resources (€200/livestock unit under the new CAP) while, at best, support schemes for landraces are only ad hoc, national policymakers, urgently need to explore mechanisms through the CAP (and equivalent national legal instruments for non-EU countries)<sup>14</sup> to systematically support the on-farm conservation of Europe’s agricultural heritage of landrace/traditional varieties of wheat and other crops.

- 12 See: Drucker, A. and Ramirez, M. 2020. Payments for Agrobiodiversity Conservation Services: An Overview of Latin American Experiences, Lessons Learned and Upscaling Challenges. *Land Use Policy*: 99 <https://doi.org/10.1016/j.landusepol.2020.104810>  
Drucker, A.; Ramirez, M. (2021) Payment for Agrobiodiversity Conservation Services (PACS) in Peru. [Video] [https://www.youtube.com/watch?v=eqdJN\\_ivSQY](https://www.youtube.com/watch?v=eqdJN_ivSQY)
- 13 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. <https://doi.org/10.1016/j.landusepol.2013.05.002>
- 14 Such as the 2020 UK Agriculture Bill, 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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