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Marketing Underutilized Plant Species for the Poor

Guillaume Gruere

Postdoctoral Fellow
Environment and Production Technology Division
International Food Policy Research Institute
Washington DC, USA
g.gruere@cgiar.org

Melinda Smale

Senior Research Fellow
Environment and Production Technology Division
International Food Policy Research Institute
Washington DC, USA
m.smale@cgiar.org

Alessandra Giuliani

Junior Professional Officer
International Plant Genetic Resource Institute
Roma, Italy
a.giuliani@cgiar.org

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Introduction

Recent publications in the development literature have underscored the importance of underutilized plant species¹ in the livelihood of the poor (Naylor et al. 2004). In our context, we define underutilized plant species as any agricultural or non-timber forest species that has the following three characteristics. First, the species is locally as compared to globally abundant, meaning that it is collected or produced in a single area or numerous, but restricted areas. Secondly, local users have a practical knowledge of the plant species, but there is a lack of scientific knowledge on the species both within and outside of the user circle. Third, the current use of an underutilized plant species is limited relative to its economic potential. Although the species has a distinctive past, present or potential use value, as well as the potential to generate significant local income, it does not now occupy a significant share of national or international trade.²

This definition raises an economic issue: Why is the current use of these species limited relative to their economic potential? Despite a growing body of scientific literature on underutilized plant species, and an emerging set of case studies about their economic value or market potential, no overarching conceptual framework has been formulated to enable systematic economic and policy analysis. In this paper, we identify the economic factors that contribute to underutilization. Then, based on economics principles, we propose necessary conditions for the successful commercialization of underutilized plant species to benefit the poor. This paper is intended to serve as a basis

¹ These species are sometimes called “orphan crops”, “minor”, or “neglected and underutilized” species.

² For example, laurel, minor millets or quinoa are underutilized plant species. Before their global expansion, kiwifruits were also considered underutilized.

for undertaking applied economics research to support the effective commercialization of underutilized plant species.

1. Searching for an economic definition of underutilized species

As we have defined them, underutilized plant species have a distinctive past, current, or potential use value, but their use is currently limited relative to their economic potential. Local abundance and the lack of scientific knowledge of the plant, the two other characteristics of our definition, also relate directly to underutilization, because they result from a restriction in use of these species compared to other plant species. Underutilization translates into undervaluation in economic terms. What explains why these crops have a positive economic value that surpasses their current value? In this section, we first characterize the sources of economic value associated with the species. Secondly, based on this characterization, we identify the economic factors that cause these plants to be underutilized.

a) Sources of economic value in underutilized plant species

Any underutilized plant species can be schematically represented as a vector linking the *observed* (or current or expressed) value of the species to the *potential* value of the species. By definition, the observed value of any underutilized plant species is inferior to its potential value so the vector is pointing outwards. At the same time each specific vector can be represented in a set of particular dimensions that represent characteristics of the species' economic value.

First, underutilized plant species are important locally to the rural poor in specific geographical areas, while contributing to global agricultural biodiversity. Thus, the value

of underutilized plant species can be divided into a private and a public component. For example some species might have an observed value that has low private and high public component. Similarly the potential value of the species could have low or high private or public contributions.

The observed value of underutilized crops can be assessed based on the market or subsistence value, and the presence of competing crop alternatives. Many underutilized crops are collected rather than cultivated, constituting a significant share of income for those who do not have many other alternatives. Other underutilized crops continue to be cultivated, competing with other crops that are more extensively grown. A revealed preference for farmers to grow underutilized crops when other alternatives are available, especially when policies favor the other alternatives, is an observable indicator of their private observed value.

In addition, the products made from a plant species are only valued if one or more economic agents has at least a basic knowledge about them. Local collectors and farmers typically have practical knowledge of the crop based on consuming it, though more distant potential consumers know little or nothing. This information gap results from a combination of the fact that the plant is locally abundant and there is a lack of scientific knowledge it. In turn, this gap is one of the sources of the economic potential of underutilized species: better transmission of knowledge would likely result in a more complete market valuation of products made from the plant.

The link between knowledge and value also means that the value of the species is a dynamic asset, and that it depends critically on the transmission of knowledge. Many underutilized plant species are locally valued, thanks to traditional knowledge. Others

may become valuable because of new scientific evidence related to their intrinsic properties, new cultural trends or fashions.

Lastly, underutilized plant species are defined as locally abundant, implying that they are valued in specific geographical areas. Information on the spatial distribution of the production and use of the species contributes to better analysis of market barriers and opportunities. There are two possibilities. First, the observed value may be limited to certain area where the species is produced and consumed. Secondly, the observed value may be dispersed among multiple areas, and either the plant species is underutilized in each of these areas, or it is only underutilized in certain areas and not others.

b) Economic constraints: market imperfections and market failures

In a perfectly competitive market, no species would be considered “underutilized:” its use would reflect its low value, and limitation of its collection or cultivation to specific areas would be justified. Plant species are thus underutilized as a consequence of market imperfections. In addition, certain species are underutilized from the viewpoint of the social optimum, because of market failures. In this section we review the major ways that these market conditions (full information, full appropriation) are not met for underutilized plant species.

- *Missing output market*

When a primary producer does not or cannot access a market for underutilized plant species, the output market is “missing.” We consider two different possibilities depending on the capacity of producers to access the market.

First, in the presence of high transaction costs, which constitute exogenous constraints, producing households may not be able to access the market. This situation is

not specific to underutilized species: high transaction costs make it impossible for households to sell or buy any type of products. They usually imply a lack of transport infrastructure, such as roads, and remoteness. For this situation to characterize an underutilized species, the crop has to be only produced by households or communities with high transaction costs.

At the community level, products derived from underutilized plant species may not only require costly transport, but also costly handling to become marketable. This may be due to bulk or freshness constraints, or because making the product usable or suitable for sale is labor-intensive. For example, extremely short shelf-life, combined with lack of refrigeration, limits the marketability of purslane (*Portulaca oleracea*) in Syria, despite its high potential demand among local consumers who appreciate its taste and suitability in Arab cuisine (Giuliani 2006).

As a second possibility, the underutilized species may be limited by endogenous constraints. The whole community is able to access a local market where the underutilized species could be sold, but there is a lack of economic incentive for each household to sell or buy the underutilized species. At the same time, community members are able to sell or buy other types of crops. For instance, if the species is used by all producing households, but that, due to its very low productivity compared to other crops (e.g., low yield), they only allocate a small planting area for it. Alternatively, due to their taste preference, they may decide to keep the underutilized species for their own use, focusing on other crops for marketing purposes. Both cases suppose that the species is only used for self-consumption in the whole community and that the underutilized species is not available or produced in any other location. It also presumes the presence

of intra household crop competition where the underutilized species is losing because of the better rent from other opportunities.³

We will now focus on situations where there is an established market for underutilized species, but where the market equilibrium is suboptimal, due to various market imperfections.

- *Suboptimal market equilibrium*

This suboptimal equilibrium is the direct consequence of one or more market imperfections. The market price does not reveal the full value of the product or consumer willingness-to-pay and the quantity produced does not represent the optimal scale of production or production capacity. In other words, there is a real potential for these species, but the observed market value is limited. At the sector level, there are three possible explanations: 1) weak demand, 2) inefficient supply and 3) a combination of the two.

Several factors may have contributed to this outcome. First, the apparent lack of demand may be due to incomplete or asymmetric information among market actors. Consumers may be willing to buy the product, but not in places where it is sold; consumers may have access to the product, but its quality at the point of purchase may be inadequate. The demand may be restricted to local community users, rural areas, aged consumers (if products of the underutilized plant species lost its appeal), low income consumers, or members of a community who use underutilized plant species products in a traditional fashion that is not known to the outside world. In some cases, introduced

³ For example, jujube (*Zizyphus jujuba*) is cultivated in home gardens along the coast of Syria, where the fruits are known and appreciated. The crop is produced for home consumption and is not traded in local communities because other crops are more competitive, and the fruits are not eaten elsewhere in the country (Giuliani 2006).

species and products are cheaper or more convenient to buy although the native underutilized plant species have greater nutritional value. For example, in Bolivia, rice and maize are consumed locally instead of quinoa because they are sold at lower prices on local markets. Quinoa is mainly produced for the export market.

Secondly, even if there is a strong demand for products derived from an underutilized plant species, there may be inefficiencies that reduce available supply or quality. In developing economies, the lack of credit and physical infrastructure impede the ability of chain actors to improve marketing approaches. Furthermore, the marketing channel may be inefficient or incomplete, adding transaction costs. In particular, an unorganized marketing channel, simple (collection and distribution) or more complex (wholesale, processing and retailing), can by itself create inefficiencies that are sufficient to limit significantly the market for underutilized plant species. An example is the market for caper buds in Syria. There is a high mark-up at the end of the supply chain, a lack of transparency, and mistrust among actors, negatively affecting the income share earned by poor collectors in rural areas (Guiliani 2006). Finally, the species may not have been improved through basic selection, resulting in germplasm with both lower productivity potential and lower value at least for commercially-oriented producers. Such inefficiencies mean that higher prices are needed for suppliers than would otherwise be the case.

- *Market failures*

Some underutilized crops are not only underutilized from a market perspective but their limited use also fails to reflect their public value. Market development will help

increase the incentive for producers to collect or cultivate these crops but at their use a socially optimum level may also require public intervention

In cases of missing market under endogenous constraints, the lack of incentive to market underutilized plant species due to the presence of other competitive crops, may be associated with a disconnection between the market (or implicit) price and the public value of the crop (for example due to the environmental value or subsistence insurance value of crop biodiversity). In other words, the value of the crop for primary producers may not reflect its social value. As a result the crop is not widely cultivated and might be used in decreasing areas despite its overall larger social gains than alternative crops.

The lack of economic information and the lack of product knowledge can also contribute to market failures, as the primary producers and public institutions are not able to assess the social benefits of using the species. For example, local populations may be ignorant of the nutritional benefit of consuming or using products from underutilized species. The lack of knowledge can be a market constraint, resulting in a lower demand than what it would be under full information. But the lack of knowledge can also contribute to market failure if the government supports the production of other primary crops without accounting for the differences in nutritional or environmental effects.

c) Classification of underutilized species

Based on these economic factors we propose a classification of underutilized species according to four major characterizations:

- ***Observed and potential value characterization***: relative private and public value; amplitude of the observed value; gap of scientific knowledge, distribution of knowledge among local users; temporal characterization; spatial characterization.

- *Output market*: missing or not, due to exogenous or endogenous constraints.
- *Presence of market imperfections*: Constraints on the demand and supply side.
- *Market failures*: Specific sources of production externality, type of public good provision (local, regional, global).

Two types of underutilized plant species will likely require primary intervention in addition to market development. These are: 1) underutilized plant species with limited potential private value but very large public value; 2) underutilized plant species with missing output markets. Set 1 may be better addressed with direct public intervention such as subsidies to support primary producers in order to avoid under-provision of the product. If exogenous market constraints are not particular to the species, Set 2 will call for more fundamental infrastructure investments before any marketing intervention is feasible.

With these two exceptions in mind, we will now suggest necessary conditions for the development of marketing systems in order to increase the observed value of these species relative to their potential, maintain or increase the social benefits of their cultivation or use, and support the income of the poor.

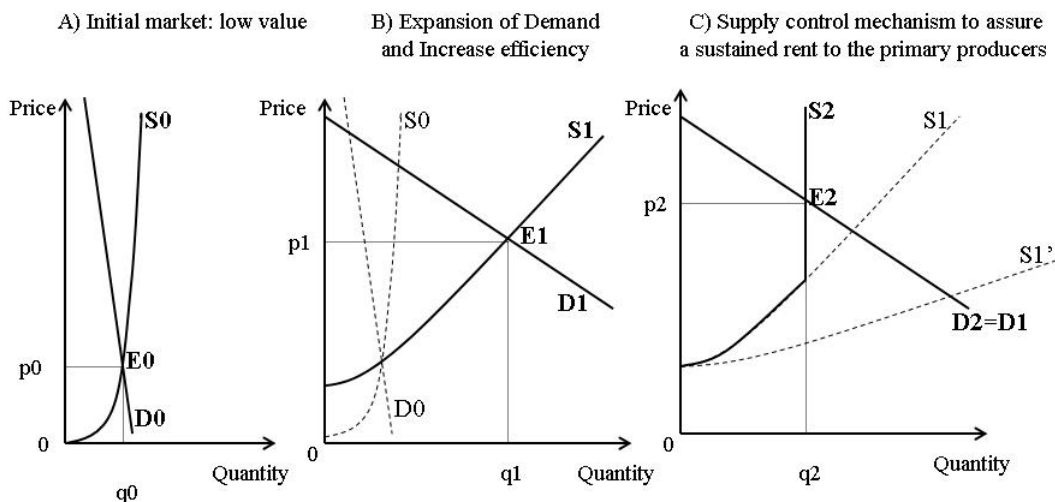
2. Necessary conditions for successful commercialization of underutilized species

We define “successful” commercialization by two characteristics. First the distribution of the benefits among actors (e.g. collectors/processors, local/international consumers, etc.) should reveal that actors at the beginning of the chain earn enough to continue producing it. Secondly, the market should be sustainable overtime, which means that prices and margins should be sustained as demand grows.

The development of marketing channels aims to help increase the value of the crop to primary producers and associated market chain actors. With marketing development, we aim to mitigate market failures, which will be manifest with the reach of new market equilibrium at a higher price and quantity level. In addition we are concerned with the distribution of benefits among actors, so a successful marketing strategy needs to sustain a sufficient level of income for the producers and other poor actors that participate in the marketing chain.

Based on the constraints described in section 1 b), we propose three simple necessary conditions to achieve a successful commercialization of underutilized species: i) expansion of demand, ii) improved efficiency of production and marketing channels, and iii) supply control mechanism.

Figure 1. Market development for underutilized species: three necessary conditions



We represent these three conditions in partial equilibrium in Figure 1. As mentioned in section 1 b), the present value of the crop can be defined by a market equilibrium with low quantity and price. Panel A in Figure 1 shows the initial market equilibrium $E_0 (p_0, q_0)$, at the intersection of the demand (D_0) and supply (S_0) curves. Panel B shows the result of two mechanisms (corresponding to necessary conditions i and ii), first demand expansion, which relates to increasing the market opportunity of the crops, and secondly increase efficiency, i.e., more efficient production and marketing systems. These two steps translate into an outward rotation of the demand and supply curves, from D_0 to D_1 and S_0 to S_1 . The market reaches a new equilibrium E_1 with a higher price- and quantity (p_1, q_1).

Finally, increasing the value of the crop implies the potential entry of large scale investments which may drive to a commoditization mechanism: better efficiency, lower prices, but also lower margins and less incentive for the poor to produce. Because we are interested in generating a sustainable rent for the poor, we propose the use of some type of supply control mechanism as explained below. Panel C in Figure 1 shows that the new supply curve corresponds to a kink of S_1 at a certain level (q_2), which is the supply control level. As a result, the price goes up from p_1 to p_2 .⁴ At the same time it generates a rent to producers that largely exceeds that obtained with commoditization- represented by its equilibrium as the intersection of D_2 with supply S_1' in Panel C. We will now explain our interpretation of these three necessary conditions in greater detail.

First, to increase the market value of underutilized crops, we need to address the primary causes of underutilization. On the demand side, it is necessary to comprehend the

⁴ This case is not necessarily typical. Our goal is to preserve opportunities for the primary producers, and not necessarily to increase the rent they can obtain from relaxing demand and supply constraints.

impediments to increasing demand and how to overcome them. An underutilized plant species cannot be successfully commercialized without a well-articulated, strong demand for its products. Our definition of underutilized plant species implies the existence of potential demand (implicit in potential value). This means that the possibility of expanding consumer demand is fundamental.

There are several possible solutions directed towards the products or towards the consumers themselves in order to help these species reach their market potential. One way is to provide better information concerning the private and public benefits of the products. Use and demand will be preceded by the transmission of knowledge among observed or potential users. For example, product fairs and rural theaters have been used to promote local products among consumers in rural areas. In Syria, poets worked together with extension agents and local project staff to write songs which were used during local festivals to draw attention to products. Another way would be to develop different uses for the product, such as the development of processing facilities and processed products. Product differentiation may also help open other market opportunities with labeling (e.g., ecolabels or 'fair trade' schemes), certification and branding. Product focus may help increase the scope of the market.

On the supply side, producers and marketing chains' actors may encounter endogenous and exogenous constraints that need to be identified and addressed. A successful marketing chain must be able to bring a product of satisfactory quality onto the market at a reasonable price. For example, there may be an endogenous lack of organizational structure, with a resulting lack of information, and risk and vulnerability for the primary producers. In addition, the production may be restricted exogenously by

the presence of fixed costs, the lack of credit markets, or the lack of infrastructures. The transmission of information may require basic communication tools. It is necessary to explore issues related to grants and credit guarantees for producers groups, and the organization of farmer groups or cooperatives, as well as the possibility of horizontal and vertical integration to allow a more effective or equitable distribution of margins.

Secondly, even with strong consumer demand and a relatively efficient marketing chain, commercialization may not be “successful” according to our definition. These two conditions do not guarantee that we achieve our objective of transmitting a share of the benefits to the local poor over time. This can be achieved in food markets appropriation of the product, which can also be seen as an indirect restriction of the quantity supplied of a good, which we call “supply control”. To avoid pressures toward commoditization and declining prices, supply control is necessary to preserve minimum rents for the producers once market failures have been taken care of and products from underutilized plant species become profitable.

Supply control can be achieved through different mechanisms: (i) by specifying product characteristics or quality attributes, (ii) by specifying production process or method used, (iii) by linking the product to its area of production (Region of origin labeling). Practically, these three mechanisms may be derived from: natural supply control (if planting is restricted to very specific areas) for (i) and (ii); pre-existing regulatory supply control (laws forbidding the cultivation or harvests in a large area) for (i), (ii) and (iii); and/or private quality⁵ brands and labels (region of origin, traditional process, fair trade, or eco label) for all cases. In turn, each of these different strategies

⁵ As compared to standards imposed through public regulations, private quality brands are imposed by chain actors. This often implies greater quality differentials or finer product distinctions.

depends on the support of well-developed institutions in order to be realized. These include: cooperative arrangements; possible joint-ventures (NGOs, public or private); legal requirements for distinctness; legal frameworks for access to resources and property rights; grading schemes and quality standards. The institutional organization that achieves supply control may be able to legally guarantee a share of the rent for primary producers.

These supply control mechanisms or product differentiation schemes can be interpreted as a direct policy instrument to increase market power. These mechanisms will not necessarily lead to increased market concentration, however. Competition can occur because of substitutions with other products, creating a multiple equilibrium market. There is a possibility of competing entities with similar supply control mechanisms, such as products from different regions that are differentiated by origin, or products that specialize in varied qualities or production processes. Furthermore, this type of supply control implies an institutional arrangement among actors of the supply chain obtaining specific rights on a specific quality attribute, like a specific type of “farmer branding” (Hayes et al. 2004). It does not completely deter entry to the market, but while it is still possible that large investments will occur, these investments will not eliminate the margins of primary producers.

3. Conclusion

Underutilized plant species pose a challenge for agricultural development, especially in an era of increasingly privatized agricultural research and less focused CGIAR research agendas. These crops are locally abundant or produced in dispersed

areas on small scales, scientific information about them is scant, and their use is currently limited relative to their economic potential. Some are potentially high-value crops. To our knowledge, agricultural economics literature has contributed little to the understanding of how to commercialize these crops of plant products successfully.

In this paper we first define what economic factors characterize underutilized species. Our classification of species is based on four main factors: 1) the relationship of the observed to the potential economic value of the species; 2) the presence or absence of an output market; and 3) the presence of market imperfections and 4) the presence of particular market failures. With this economic characterization, we exclude species for which developing markets is in or of itself irrelevant. We then identify three necessary conditions to the successful commercialization of underutilized plant species for the poor: demand expansion, increase efficiency of supply and supply control mechanism.

The purpose of developing this simple conceptual framework is to provide a basis for the design of an empirical investigation of marketing solutions for underutilized plant species among the rural poor in developing economies. The framework will help us generate testable hypotheses concerning the commercialization of underutilized plant species, appropriate policy interventions, and social welfare implications.

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