

Demand-Led Breeding

Product Profiles – A Practitioners' Guide

Creating product profile summaries

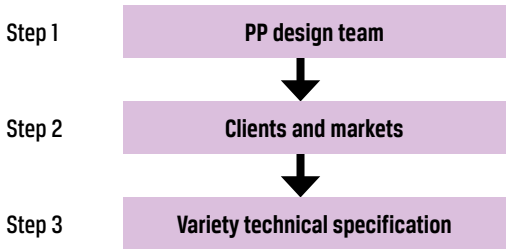




Introduction

This is a guide to support practitioners in plant breeding and crop improvement to create a product profile (PP) summary. A product profile summary is comprised of two pages and is prepared in three steps:

1. **Product profile design team** – information about the composition of the team of experts that have contributed to the design of the new variety.
2. **Clients and markets** – information about who the variety has been created to serve and the target markets.
3. **Technical specification of the variety** – an explanation about the design of the new variety and its targeted technical attributes.



A template has been developed with the primary purpose of communication of product profiles (PP). Completion of the PP template will enable the PP leader/champion and/or members of the design team to communicate the target product profile of a new variety to a range of technical and non-technical audiences. The contents of the template should enable audiences to visualize who the variety has been designed for, how it will be grown and its technical characteristics.

Communication to different audiences has several purposes:

- **Members of the product design team** – to ensure there is a common agreement and support for the product profile
- **R&D Institution management** – for awareness about the new variety proposed by the design team and for prioritizing use of breeding resources
- **Crop variety development team** – to either seek suitable varieties from other countries that might provide the desired profile or to develop the breeding strategy to deliver the new variety
- **Technology transfer managers** – to seek access to the germplasm and traits required to develop the new variety from potential collaborators or partners and ensure freedom to use the germplasm, traits or techniques
- **Seed-scaling organizations and value chain representatives** – to communicate the target profile and seek their input, support and feedback during the breeding program
- **Investors and donors** – to win financial support for the development program to produce the new variety.

The PP template has been designed to cater for many different clients in value chains, their use of a crop, their drivers for purchasing and satisfaction with a new variety. These include buying decisions of farmers, transporters, processors, retailers, consumers, seed/propagation material producers and seed distributors. This list is not exhaustive and additional cells or categories may be required to adequately communicate your new variety design. The lists of categories and traits shown are examples to demonstrate how to complete the template. All highlighted cells should be completed. Some of the cells may not be relevant for your specific product profile and in this case either leave the cell blank or include NA (not appropriate).

To complete a product profile summary follow the three steps in the PP summary template. You have the option to either read the description here within this Practitioners' Guide or to hover your mouse over the relevant cell in the Excel template and read the descriptions there as an Excel note.

PP Variety design team

This page describes:

The composition of the team of experts needed to create product profiles.

Step 1

1 PP Design Team Lead/Champion	Name
	Organization

2 PP Design Team		
Person 2.1	Area of Expertise 2.2	Name of organization 2.3
Name 1		
Name 2		
Name 3		
Name 4		
Name 5		
Name 6		

1 PP Design team lead/champion

This is the person leading the product profile creation process. The lead seeks inputs from a range of relevant experts needed to create the design. The lead is the person most likely to complete this summary template, be the champion for the product profile, and ensure it is communicated to a broader community to win support.

2 PP Design team

This is the group of experts that have created the product design. Typically, this will include inputs from a multidiscipline group of about 5–9 experts. Each will provide specialist knowledge about one or more of the following inputs: market and demand, value chain dynamics, socio-economic considerations, breeding and feasibility, scientific and technical support functions, and crop management expertise. The precise composition of the expert inputs required will depend on who the variety is designed to serve, the value chain and the individual technical attributes of the variety. The inputs may have been gathered during a meeting of the experts or, more likely, from a range of discussions so that all key drivers and considerations involved at any stage of the process are given adequate consideration. A quality product profile will have the ownership and support of the whole design team. The PP design leader and team are accountable for the quality of the data, inputs and foresight used to create the product profile. The design team members may or may not be part of the team that proceeds with the variety development or the search for suitable varieties from other countries.

2.1 Person

This is the name of the expert contributing their knowledge into creating the product profile.

2.2 Area of expertise

Market, technical and crop management expertise. The design team leader requires inputs and knowledge from experts. This knowledge may or may not be required within the expert's current job in an organization. Here is a list of examples of types of expertise that may have been required:

1. Breeder
2. Agricultural economist
3. Market research expert
4. Public health/nutritionist
5. Seeds systems expert (public and/or private sector)
6. Value chain representative(s)
7. Climate change specialist
8. Agronomist
9. Plant pathologist
10. Entomologist
11. Food scientist
12. Private sector processing expert
13. Youth and gender expert
14. Farmer representatives
15. Variety development management expert
16. Intellectual property or technology transfer expert
17. Variety release/National registration expert, etc.

2.3 Name of organization

This is the name of the organization that employs the expert or where the expert has a professional affiliation.

PP Clients and markets

This page describes who the variety has been created to serve, its markets, uses and growing system.

Step 2

3	Product profile descriptors	
3.1	Product profile name	
3.2	Crop	
3.3	Country(s)	
3.4	Geographic region(s)	
3.5	Market segment and positioning	
3.6	Name of target variety(s) or landrace to be replaced strengths, weaknesses	
3.7	Date PP created (dd.mm.yyyy)	
4	Target client and use	
4.1	Value chain primary clients/customers: farmers, processors, transporters, consumers, etc.	
4.2	Market scale: households, local, regional, national and international markets	
4.3	Use: food, animal feed, energy, medicinal, clothing, etc.	
4.4	Type of processing: none (fresh), dried, cooked, milled, canned, brewed, etc.	
4.5	Market class: bean type, wheat quality, etc.	
5	Target crop producers and production system	
5.1	Number of farmers (min–max range)	
5.2	% ratio: male to female farmers (min–max range)	
5.3	Production system: open field (+/- irrigation), plastic tunnel, glasshouse, hydroponics	
5.4	Area of production system (ha)	
5.5	Growth habit: e.g. beans, tomatoes, grapes (bush, climbing, etc.)	
5.6	Expected level of inputs: low, medium, high (fertilizer, crop protection chemicals)	
5.7	Typical yield range of target system (e.g. 0.8–1.5 t/ha)	
5.8	Cropping system: continuous monocrop, rotated intercrop, intercrop mixed cropping,	
5.9	Mechanization: planting, maintenance and harvesting	
5.10	Agroecological zone(s)	
5.11	Total seed or vegetative propagation material market (tonnes/numbers)	
Screenshot of Excel template → check USB-Stick		

3 Product profile descriptors

This section contains descriptors that provide a brief overview of the new crop variety profile, where it will be used, its intended market, market positioning and benefits over the current lead variety in its market segment, together with a record of the date of conception.

3.1 Product profile name

This is the name or title of the product profile that has been created. This name is important for communication. It should be unique, short and descriptive, so that if several product profiles are being communicated this specific one is easy to identify. For guidance: no longer than c. 5–7 words maximum.

3.2 Crop

This is the target crop described in this product profile. It should contain the common name and the Latin name.

3.3 Country(s)

This is the list of countries where this variety has been designed to provide benefits to farmers and their value chains.

3.4 Geographic region(s)

Areas within a specific country where this variety design is likely to appeal to farmers and their value chains.

3.5 Target market segment and positioning

This is a statement or short description comprising 2–3 sentences. It summarizes the target market segment and how the new variety will be positioned with its benefits over existing varieties in that segment.

3.6 Name of target variety(s) or landrace to be replaced

This is the variety or landrace targeted for replacement by the new improved variety described in this product profile. It is likely to be the reference germplasm/check that will be included in all performance trials. The strengths and weaknesses of the variety to be replaced should be highlighted. This may not be applicable if the new variety represents a new use and there is no existing variety to make comparisons with.

Example: NAROBAN 1

Strength (moderate Fe & Zn, high yield and early maturing)

Weakness (long cooking time and susceptible to bruchids)

3.7 Date PP created

Date the PP was created by the design team. If the product profile is subsequently modified for any reason a second date/version should also be displayed.

4 Target client and use

This section of headings describes the market and use of the new variety. It is structured so the reader can understand the clients the variety is designed for and the use of the crop.

4.1 Value chain primary clients/customers

There are many actors in markets and value chains, e.g. farmers, processors, transporters, consumers, etc. The actors to be listed in this cell are those that are the primary beneficiaries of the PP as it has been designed. They should be consulted with as part of the germplasm progression decisions during the development and commercialisation process. *Do not include all actors in the value chain – only those associated with traits which have been put in the design to specifically target value chain actors' needs.*

4.2 Market scale

From the following list, identify the markets that the new variety has been designed to enter and separate with commas, e.g. households, local, regional, national and international markets.

4.3 Use

List the uses that the new variety has been designed for and separate with commas, e.g. food, animal feed, energy, medicinal, clothing, housing, etc.

4.4 Type of processing

List the types of processing that the new variety has been designed for and separate with commas if there is more than one type of processing, e.g. none (fresh), dried, cooked, milled, canned, brewed, etc. If no processing is expected to be undertaken with this variety write in the cell "none".

4.5 Market class

Some crops have market classes that have specific technical attributes. If the product profile has been designed with this in mind please include the class, e.g. malting barley for brewing, bean colour or type, wheat quality for pasta-making, tomato type (cherry, plum, large round, etc.).

5 Target crop producers and production system

This section defines the quantitative scale of farmers that this variety has been designed to suit, their location, production growing system and the amount of seed or propagation material that would be needed if all these farmers were to grow this variety. This refers to the total maximum number of potential farmers that could grow this variety. *It is not referring to a market share of users.*

5.1 Number of farmers (min-max range)

This is the number of farmers for whom the design could suit their needs and the variety is expected to perform. To make the estimations easier, it is recommended that you include a range (min-max) rather than a fixed number of farmers. This is also so that you do not imply a false sense of accuracy about the statistics available on the numbers of farmers in the specified regions that this variety could suit. A maximum variation of 1–1.5 accuracy is suggested, i.e. 20,000–30,000 or 1 million–1.5 million farmers. This range represents the total number of potential users and not the proposed market share. The latter depends on a range of additional factors such as price, access to seed, and many other drivers for adoption that would be needed in a product investment case.

5.2 % ratio: male to female farmers (min-max range)

This is the percentage range of the total number of farmers that the design could suit that are women and men, e.g. 30–40%:60–70% ratio of men:women.

5.3 Production system

This is the growing production system that the variety is designed to suit, e.g. open field (+/-irrigation), plastic tunnel, glasshouse, hydroponics. If there is more than one suitable production system, please include all and separate by commas.

5.4 Area of production system (min-max range in ha)

Please indicate the total size of area of the production system (expressed as a range of ha) that the variety has been designed to be suitable for growing, e.g. open field 100,000–200,000 ha + area under plastic 3000–5000 ha.

5.5 Growth habit

For some crops the growth habit is an important consideration in the variety design, crop architecture and line selection, e.g. beans, tomatoes, grapes (bush, climbing, etc.). Please indicate for your crop if there is a specific growth habit. This is more relevant for fruits and vegetables than cereal crops.

5.6 Expected level of inputs

Please indicate the intensification of inputs likely to be used where the new variety is designed to be grown, e.g. low, medium, high inputs (considering fertilizer, crop protection chemicals and/or any others).

5.7 Typical yield range of target system (e.g. 0.8–1.5 t/ha)

Please include the typical yield range per hectare that is usually obtained by farmers in this growing system (e.g. 0.8–1.5 t/ha). This is so that the reader can visualise the current production situation. *It is not the yield expected with the new improved variety.*

5.8 Cropping system

Please give an indication of the crop system that the variety has been designed to be grown under, e.g. continuous monocrop, rotated with other crops, inter-crop/mixed cropping. If more than one system, please list and separate by commas, etc.

5.9 Mechanization

Please indicate if the design of the variety has been tailored to suit specific mechanization procedures for planting, crop maintenance and harvesting.

5.10 Agroecological zone(s)

These are the recognized growing zones and soil types in which the variety is designed to grow well.

5.11 Total seed or vegetative propagation material market

This is to give an indication of the scale of the amount of seed or numbers/weight of propagation materials used in this market segment. This is the total amount of seed required if all potential users wished to access seed, i.e. maximum seed required at farm level if 100% variety adoption. It represents the total potential demand rather than a demand based on assumptions on market-share. This is usually calculated by multiplying the area of crop production (ha) in this market segment by the average seeding rate (kg per ha) to give a total estimated figure for seed or vegetative propagation material.

Clients and markets



Variety technical specification



Product profile – Variety design and technical specification

This page describes the variety design and the technical specification of the target product profile. It is created by looking at the targeted clients in the value chain and using market research and foresight to identify a composition of traits that deliver benefits and create value for selected actors in their markets and value chains.

Step 3

6	7	8	9			
Client/customer	Driver	Trait category	Preference group: Women (W) Men (M) Youth (Y) W+M+Y (All)	Trait demand classification: 1 . Essential/"must have" 2. Niche opportunity 3. Added-value 4. Winning trait	Target t	
Farmer	Productivity	Yield			e.g. eco	
					e.g. fert	
					e.g. gra	
		Biotic stress resistance			e.g. fun	
					e.g. inse	
					e.g. ner	
		Abiotic stress tolerance			e.g. dro	
	Fodder/forage		Biomass			e.g. tot
			Animal nutrition			e.g. pro
			Animal palatability			e.g. leve
		Animal digestibility			e.g. me	
	Crop management and harvesting	Plant architecture			e.g. cro mechar	
	Market value and price	Grain weight			e.g. see	
		Crop duration			e.g. ear	
	Post-harvest storage	Storage-life			e.g. pot	
				e.g. my		
Transporter	Durability and cost	Container suitability			e.g. sha	
		Transportability and storage			e.g. my	
Processor	Raw material quality specification	Milling			e.g. gra	
		Bread-making			e.g. hag	
		Brewing			e.g. pro	
		Paste			e.g. ton	
		Canning			e.g. bea	
Retailer	Sales and profit	Shelf-life			e.g. day	
Consumer	Satisfaction	Taste			e.g. org	
		Appearance			e.g. fruit	
		Shelf-life			e.g. day	
		Nutrition			e.g. pro	
		Digestibility			e.g. gas	
		Food preparation			e.g. fast	
Seed/vegetative material producer	Scalability and cost	Seed numbers			e.g. nur	
		Reproductive fertility			e.g. rice	
		Ease of vegetative propagation			e.g. pro	
Seed distributors	Variety identification	Unique appearance of plants, grain and produce			e.g. phe	

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6 Client/customer

These are the people that the variety has been specifically designed to serve and may include one or more of the following value chain actors:

- Farmer
- Transporter
- Processor
- Retailer
- Consumer
- Seed/vegetative material producer
- Seed distributors

7 Drivers

For each of the value chain actors, drivers are the list of diverse factors that influence clients/customers and their purchasing decisions for the new variety. Each of these drivers can and should influence the design of the new variety. These drivers are likely to be different for different actors and might include:

- Productivity – food and feed
- Fodder/forage – biomass of crop
- Crop management and harvesting
- Market value and price*
- Post-harvest storage
- Durability and cost
- Raw material quality specification
- Sales and profit
- Satisfaction
- Scalability and cost
- Variety identification**

*Market value and price

This driver is referring to traits that can increase farmer income through obtaining a higher price from the off-taker or market retailer and do not involve a direct benefit to consumers. Examples include: early harvest ahead of the main season where there is high customer demand but low supply, which results in higher prices for the farmer; higher grain density in cases where the farmer is paid based on grain weight rather than sack volume.

** Variety identification

This is using breeding to provide a phenotypic marker (or simple, very low-cost diagnostic markers that can be used *in situ*) so that varieties are easy to identify. There are benefits for several actors in value chains: (i) breeders can identify their varieties in the field and in markets and (ii) get better estimations for farmer adoption rather than relying on the memories of purchasers about the variety they bought; seed distributors will benefit from easy authentication of seed variety integrity and be able to identify piracy; retailers and consumers will know the variety advertised is the variety they are paying for. This is particularly relevant when varieties contain winning traits that justify higher prices, in that purchasers know what they are buying is what they are paying for.

8 Trait category

Specific traits have been organised into trait categories so that traits that respond to the same client drivers are grouped together. This grouping helps make the traits easier to visualize. These categories are somewhat arbitrary, and the design team are encouraged to change them if new headers can make the collection of associated traits easier to understand. Typical examples of categories of traits include:

- Yield
- Biotic stress resistance
- Abiotic tolerance
- Traits for animal consumption, e.g. biomass, animal nutrition, palatability and digestibility
- Plant architecture

- Traits affecting market value and especially price, e.g. bean grain weight, early or late season harvesting
- Storage life
- Transportation, e.g. shape for container suitability and durability
- Processing traits, e.g. milling, bread-making, brewing, paste, canning, etc.
- Retailer shelf-life
- Consumer traits, e.g. taste, appearance, shelf-life, nutrition, digestibility, food preparation
- Scalability and cost considerations, e.g. seed number, fertility, reproduction ratio, ease of vegetative propagation
- Variety identity traits

9 Preference group

A preference group is a subset of existing client/customer groups that the variety has been specifically designed to serve. A trait is highly demanded because it meets the strong preferences or needs of the specified group and is part of the variety design:

Women (W) – a trait preferred by women

Men (M) – a trait preferred by men

Youth (Y) – a trait preference by men and women under the age of 30

W+M+Y (All) – a trait for all users

Trait demand classification e.g. *essential*/*"must-have"* trait, *added-value* trait or *winning* trait. Each trait is classified according to its expected influence on market demand. There are four classifications. Each trait should be given a single classification:

Essential/*"must-have"* trait

These traits are considered a prerequisite in variety design to ensure the variety will be used. Sometimes the traits are referred to as "must-have" traits. This may be because all popular varieties contain this trait and it is expected within the market, or it is an imperative of national release committees for variety approval.

Niche opportunity trait

These are traits that provide a superior technical benefit for users over existing varieties and may command a price premium. However, the scale of users and market demand is likely to be limited due to the market being specialised or limited in some way, e.g. malting barley.

Added-value trait

This is a trait that provides a special market quality over what is offered by alternative existing varieties. It provides additional value to either farmers or their buyers in the value chain. The trait provides recognized technical differentiation from what is currently available, e.g. production or processing benefits that have a monetary value. An added-value trait would enable a new variety to gain market share from existing varieties and may command a small price premium.

Winning trait

A winning trait has similarities to an added-value trait in that it creates additional value. However, the value is significantly higher and provides more substantial economic or social benefit. A winning trait is one which enables a variety to be highly differentiated from alternative varieties. In most cases it would be expected to create high demand and take major market share from existing varieties. The significant value offered means that buyers are more likely to pay higher prices for the seeds or crop produce. Winning traits are not discovered often and usually bring innovation. Their uniqueness may catalyse the emergence of new markets. A historical example is the semi-dwarf trait in wheat and rice that catalysed the Green Revolution. Seed for these varieties became highly sought after and new varieties commanded a distinctly higher price.

Product profile – Variety design and technical specification

This page describes the variety design and the technical specification of the target product profile. It is created by looking at the targeted clients in the value chain and using market research and foresight to identify a composition of traits that deliver benefits and create value for selected actors in their markets and value chains.

Step 3

		10	11	12	13
Reference group: Women (W) Men (M) Youth (Y) W+M+Y (All)	Trait demand classification: 1. Essential/"must have" 2. Niche opportunity 3. Added-value 4. Winning trait	Target traits	Trait description (Quantitative measures)	Name of benchmark variety	Performance required compared to benchmark variety <,> etc.
		e.g. economic yield			
		e.g. fertiliser efficiency			
		e.g. grain size			
		e.g. fungi, bacteria and viruses			
		e.g. insect pests			
		e.g. nematodes			
		e.g. drought, heat, salinity			
		e.g. total dry biomass			
		e.g. protein content			
		e.g. level of odoriferous compounds			
		e.g. methane production			
		e.g. crop height, pod clearance for mechanical harvesting for bean, chickpea			
		e.g. seed density			
		e.g. early or late maturation			
		e.g. potato sprouting dormancy			
		e.g. mycotoxin production			
		e.g. shape of aubergines for packing crates			
		e.g. mycotoxin production			
		e.g. grain milling efficiency			
		e.g. hagberg falling number			
		e.g. protein content malting barley			
		e.g. tomato brix value			
		e.g. bean grain splitting			
		e.g. days post-harvest			
		e.g. organoleptic properties			
		e.g. fruit shape uniformity			
		e.g. days before fungal decay			
		e.g. protein content, Fe, Zn, etc.			
		e.g. gas production			
		e.g. fast cooking time			
		e.g. number of bean seeds in pods			
		e.g. rice spikelet fertility			
		e.g. propagule storability			
		e.g. phenotypic mark			

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10 Target traits

These are examples of traits specific to the needs and preferences of the beneficiaries whom the variety is being designed to serve. Replace these examples with traits chosen by the PP design team, each on a single line, followed by a description with quantitative measures where possible, a comparative variety benchmark, and the target performance of the trait.

11 Trait description

The trait description should give some more details about the trait and, where possible, some quantification of the performance of the trait required, e.g. the level of disease resistance, the yield improvement in tonnes per ha, or brix number for processed tomatoes.

12 Name of benchmark variety

Each trait you have selected should have a target performance that you are seeking to achieve. This performance is best demonstrated by comparison to a known variety or landrace. This variety is called the benchmark variety, i.e. you are benchmarking the performance of your new variety against a known germplasm. Each trait will have its own benchmark variety, which is identified by the name or code the variety is known by. This may be the same variety or a different variety for each trait. For some, but probably not all, of the traits the benchmark variety is likely to be the target variety to be replaced, as shown in step 2. There will be different varieties listed for one or more different traits. The benchmark variety may be the variety that is used as the check in national registration trials for some traits, but not necessarily for every trait.

13 Performance required compared to benchmark variety (<, =, > etc.

This is the target performance required compared to the selected variety benchmark, i.e. the target performance is < (less than) the benchmark, = (equal to) the benchmark or > (greater than) the benchmark.

Creating product profile summaries

Follow the three steps in the PP summary template. You have the option to either read the descriptions here within this Practitioner's Guide or to hover your mouse over the relevant cell in the Excel template.

For assistance in completing your product profile communication summary, and to join the DLB Community of practice, please contact:

Dr Nasser Yao, DLB Pan-Africa Coordinator, Alliance of Bioversity and CIAT, Nairobi, Kenya (n.yao@cgiar.org)



Acknowledgements

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Demand-led Breeding

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For further information:

DLB website: www.demandledbreeding.org

To join the "**DLB Community of Practice**", please contact: Dr Nasser Yao, DLB Pan-Africa Coordinator, Alliance of Bioversity and CIAT, Nairobi Kenya (n.yao@cgiar.org)

