Alliance Bioversity International-CIAT Breeding Modernization Workshop

DLB Product concept and product profiling tools

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Organization: Alliance Bioversity International-CIAT

Event: Breeding Modernization workshop, online meeting December 7th 2021

Outline

- DLB in brief: Definition and journey
- Product profile: Definition, importance and process
    * PP and Gender & inclusion
- What steps beyond developing the Product Profile?
- Concluding remarks: Product profile vs Product concept

What's DLB: An International Food Security Alliance

acci

UNIVERSITY OF NAIROBI

WACCI

NARO

WE BUILD FOR THE FUTURE

EIAR
Ethiopian Institute of Agricultural Research

Alliance

Bioversity International

CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change

PABRA
Pan-Africa Bean Research Alliance
Better Beans for Africa

Crawford Fund FOR A FOOD SECURE WORLD

syngenta foundation for sustainable agriculture

Australian Government
Australian Centre for International Agricultural Research

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA
CREATE CHANGE

d·lb demand-led breeding

www.demandledbreeding.org

What's DLB?

* Demand/Market-led breeding is new way of developing modern high performing crop varieties that are customer-focused to improve the livelihood of smallholder farmers

* DLB is NOT Participatory Plant Breeding (PPB), even though both concepts share some similarities

  - DLB develop varieties with inputs from a broad range of sources (clients, stakeholders, value chain actors and non-technical experts)

* DLB is an holistic approach implemented through seven core pillars

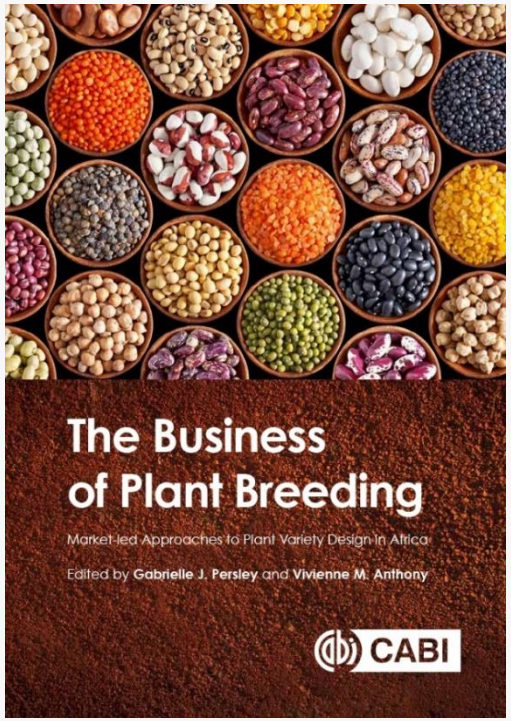
DLB Journey Toward the Product Profile

* Train over 400 breeding related scientists which form the DLB Community of Practice

* Inclusion of DLB in the curriculum of partner universities (WACCI, ACCI, UoN and Makerere University)

* DLB book -The Business of plant breeding

* Institutionalisation of DLB in institutions (Universities above and research institutions in Ethiopia)

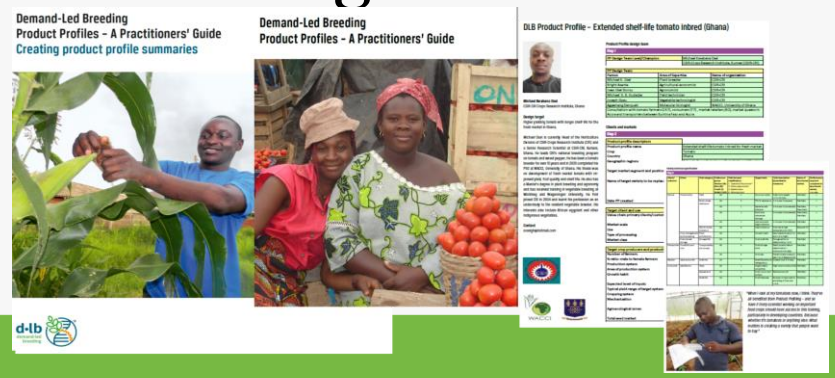


DLB Journey Toward the Product Profile

* Deployment of DLB in public and private institutions through the PABRA network and corridors and university partners

* Understood Africa's plant breeders along with their variety portfolio

* DLB Product profile tool and Practitioners' guide



What's Product Profile and Why Does it Matter?

DLB Product Profile has dual purpose objectives

Actual Concept translated into breeding objectives (several PPs)

* Technical specification of a new variety using a detailed set of technical attributes with quantitative measures and qualitative descriptions

* Depends on trait prioritization and external performance standards

Communication tool for technical and non-technical audiences to win their support

* Key actors of value chain

* R&D managers

* Donor community

Steps Toward Developing the Product Profile: Understanding Clients and Their Needs

- Knowledge and methods acquisition to understand:
    * Crops and their uses
    * Clients, stakeholders and their value chains, their needs,
    * What clients prefer and are prepared to pay for in a new variety

- Conduct market research: through survey or market intelligence

- Identify markets and market segments

Steps Toward Developing the Product Profile: Understanding Clients and their Needs

* **Market research/intelligence:**

  - Characterize existing varieties used by farmers

  - Identify **current and future** properties important to clients and stakeholders along the value chain

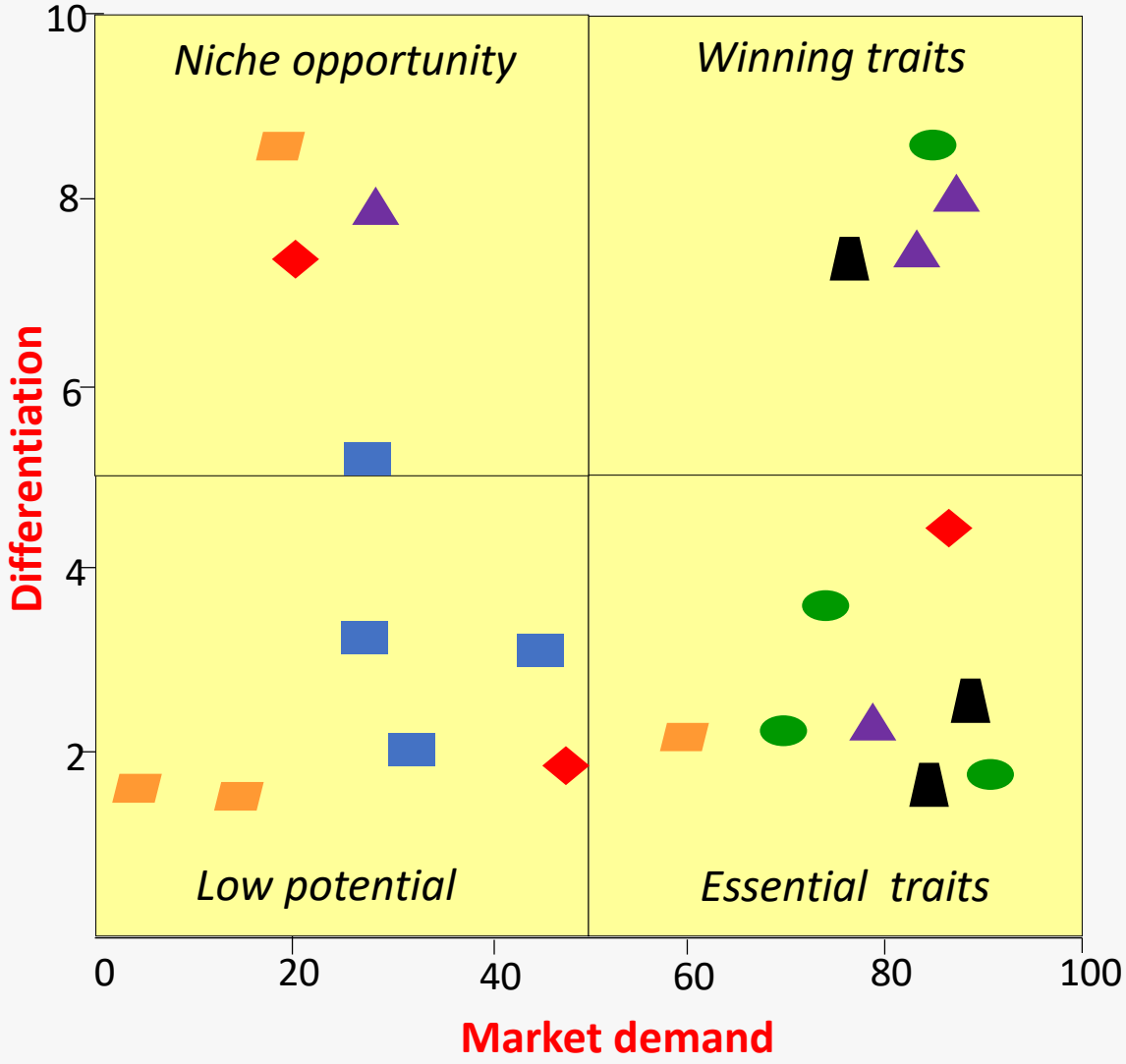
* **Benchmarks setting** to meet client needs

* **Traits Prioritization** and making trade-off decisions

Traits Prioritization: The Underlining Principle

- **Market evaluation** for each trait has two dimensions

1. **Differentiation**
   - Willingness to pay price premium
   - Opportunity to grow market share
2. **Market demand**
   - % growers/area that need this trait



Technical issues & feasibility

1. Genetics
2. Regulation requirements
3. Costs/budget
4. Gender inclusion

Yield
Plant architecture
Biotic stress
Abiotic stress
Crop handling
Consumer preference

Product Profile Capture Template: Design team, clients and markets

Michael Kwabena Osei
CSIR-CRI Crops Research Institute, Ghana

Design target
Higher yielding tomato with longer shelf-life for the fresh market in Ghana.

Michael Osei is currently Head of the Horticulture Division of CSIR-Crops Research Institute (CRI) and a Senior Research Scientist at CSIR-CRI, Kumasi, Ghana. He leads CRI's national breeding program on tomato and sweet pepper. He has been a tomato breeder for over 10 years and in 2020 completed his PhD at WACCI, University of Ghana. His thesis was on development of fresh market tomato with improved yield, fruit quality and shelf life. He also has a Master's degree in plant breeding and agronomy and has received training in vegetable breeding at Worldveg and Wageningen University. He first joined CRI in 2004 and learnt his profession as an understudy to the resident vegetable breeder. His interests also include African eggplant and other indigenous vegetables.

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	Area of Expertise	Name of organization
	Breeder	Alliance of Bioversity-CIAT, Tanzania
	Seed systems	Alliance of Bioversity-CIAT, Kenya
	Bean breeder	Tanzania Agricultral Research Institute (TARI-Selian)
	Seed systems	TARI-Selian
	Socio-economist	TARI-Selian
	Nutritionist	TARI-Selian
	Domestic trader/exporter	BAYMAC company
	Bean processor	JAGEF group

Clients and markets

Step 2

Product profile descriptors	
Product profile name	Yellow dry bean
Crop	Common bean *(Phaseolus vulgaris L.)*
Country	Tanzania
Geographic regions	Northern, Western and Southern highlands
Market segment	New emerging market for yellow bean grain, with good taste and medium cooking time, grown at an altitude of 900–1800 m
Name of target variety to be replaced	Selian 13 **Strength:** Early maturing, medium cooking time, palatable with good taste **Weakness:** Low yielding, susceptible to anthracnose, angular leaf spot and bruchids
Date PP created	07.07.2020

Target client and use	
Value chain primary clients/customers	Farmers, traders, consumers (women and children)
Market scale	Local, regional, national and international export markets
Use	Grain and flour for food, haulms for animal feed
Type of processing	Dried grain, pre-cooked beans
Market class	Yellow bean

Target crop producers and production system	
Number of farmers	800,000–1,050,000
% ratio: male to female farmers	50–60% male; 40–50% female
Production system	Open field
Area of production system	200,000-338,000 ha
Growth habit	Bush (determinate)
Expected level of inputs	Low – fertilizer, crop protection chemicals
Typical yield range of target system	0.5-0.8 t/ha (grain yield under farmer conditions)
Cropping system	Monocropping and intercropping with maize
Mechanisation	Some mechanical threshing
Agroecological zone	Altitude 900–1800 m
Total seed market	12,000–20,000 tonnes

Product Profile Capture Template: Technical specifications of the variety

Variety technical specification

Step 3

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 traits	Trait description (Quantitative measures)	Name of benchmark variety	Performance required compared to benchmark variety <,=,> etc.
Farmer	Productivity	Yield	All	1	Grain yield	Dry grain weight >2 t/ha	Selian 13	>
		Biotic stress resistance	All	1	Angular leaf spot (ALS)	<3 (CIAT scale)	Jesca	>
			All	1	Anthracnose	<3 (CIAT scale)	Selian 10	>
		Abiotic stress tolerance	All	1	Drought	Medium tolerance – at flowering stage (terminal and intermittent drought)	Selian 12	>
		Biomass	All	3	Biomass	Dry pods and stem	Jesca	>
	Crop management and harvesting	Plant architecture	All	3	Uniform flowering time	Terminal inflorescences flower at same time	Selian 13	>
	Market value and price	Grain weight	All	1	Dry grain weight	Grain weight - bag of six buckets (approx 18 kg each)	Lyamungo 90	>
		Crop duration	All	4	Early maturing	<67 days	Selian 13	<
Consumer	Satisfaction	Taste	All	1	Taste	Palatability	Selian 13	>
		Appearance	All	4	Yellow colour	Uniform and attractive	Selian 13	>
		Nutrition	W	1	High grain micronutrient content (Zn, Fe)	Iron > 50 ppm, Zinc > 25 ppm	RWR-21-54	>
		Digestibility	W	1	Flatulence, soft seed coat after cooking	Low gas production	Selian 13	<
		Food preparation	W	1	Cooking time	Less than 60 min in consumer conditions	Selian 13	<
Seed producer	Scalability and cost	Seed genetic purity	All	1	Seed germination	>97% viability and 99% uniformity	Selian 13	>

Product Profile & Gender Inclusion

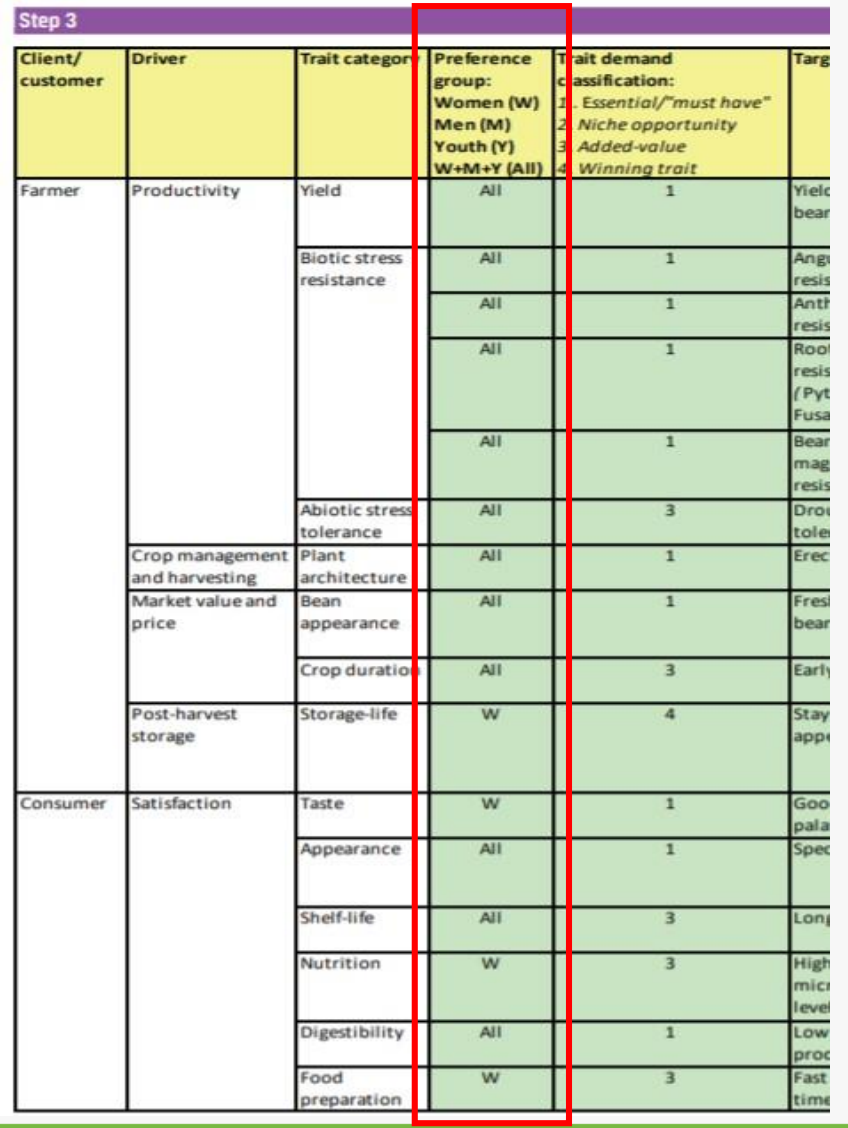
- Gender relates to socially assigned roles and behaviours attributable to men and women

  - Gender influences the distribution of resources, work, decision making, wealth, political power, enjoyment of right and entitlements within the family

- Product profiles should not be biased towards specific groups and ignore others. How to balance the social and economic differences?

- Examples of gender related traits:

1. Harvest ease, Cooking time, Plant architecture-mechanization
2. Micronutrient content (High Fe and Zn), Marketability (market grain classes)



Step 3

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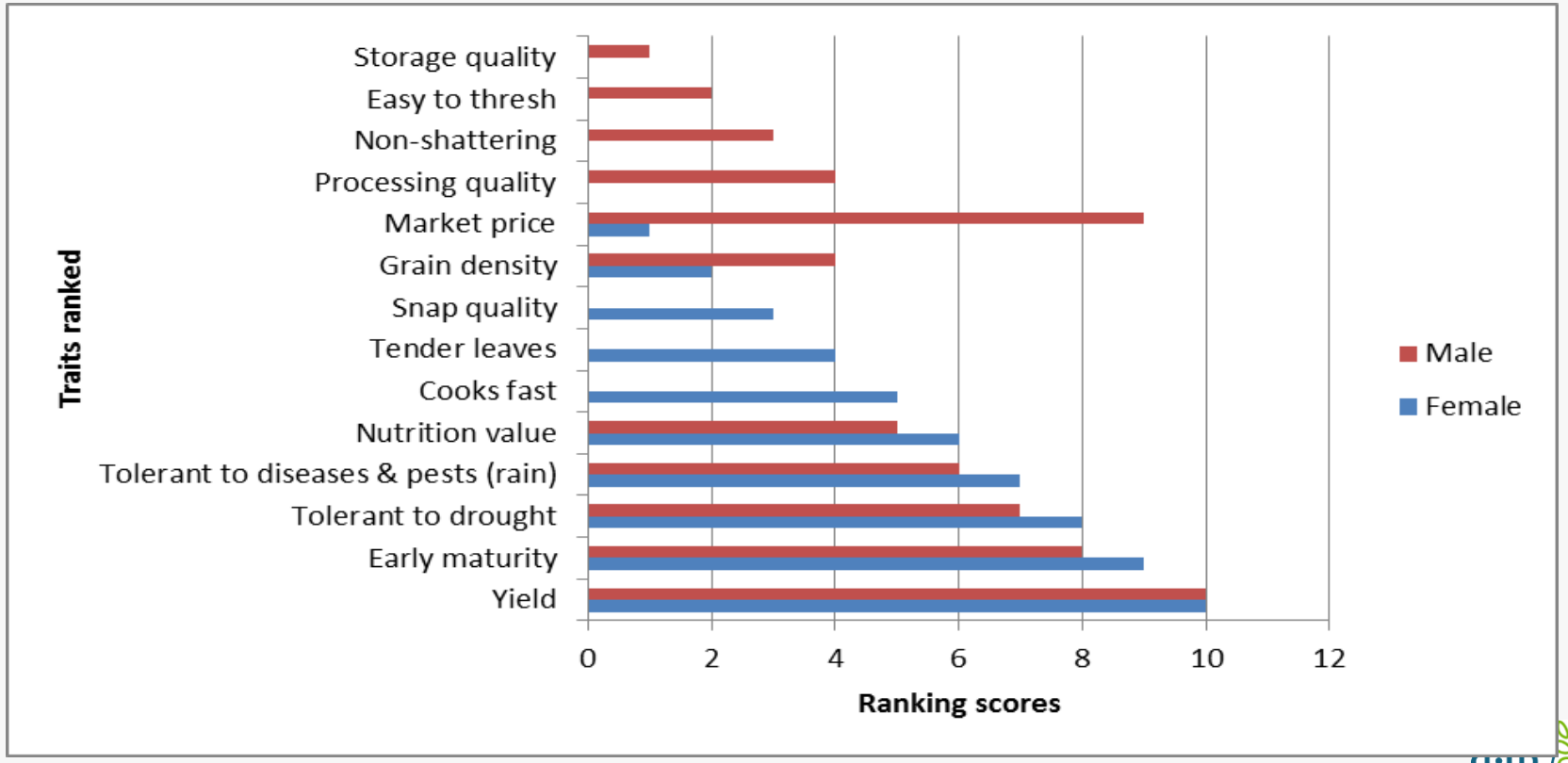
Farmer	Productivity	Yield	All	1	Yield bear
		Biotic stress resistance	All	1	Ang resis
			All	1	Anth resis
			All	1	Root resis (Pyt Fusa
			All	1	Bear mag resis
		Abiotic stress tolerance	All	3	Drou tole
	Crop management and harvesting	Plant architecture	All	1	Erec
	Market value and price	Bean appearance	All	1	Fresi bear
		Crop duration	All	3	Early
	Post-harvest storage	Storage-life	W	4	Stay appe
Consumer	Satisfaction	Taste	W	1	Goo pala
		Appearance	All	1	Spec
		Shelf-life	All	3	Long
		Nutrition	W	3	High mic leve
		Digestibility	All	1	Low proc
		Food preparation	W	3	Fast time

Traits Prioritization and Gender Inclusion in Product Development

Traits prioritization through multi stakeholder platforms (Business Innovation Platforms & Rwanda bean alliance)

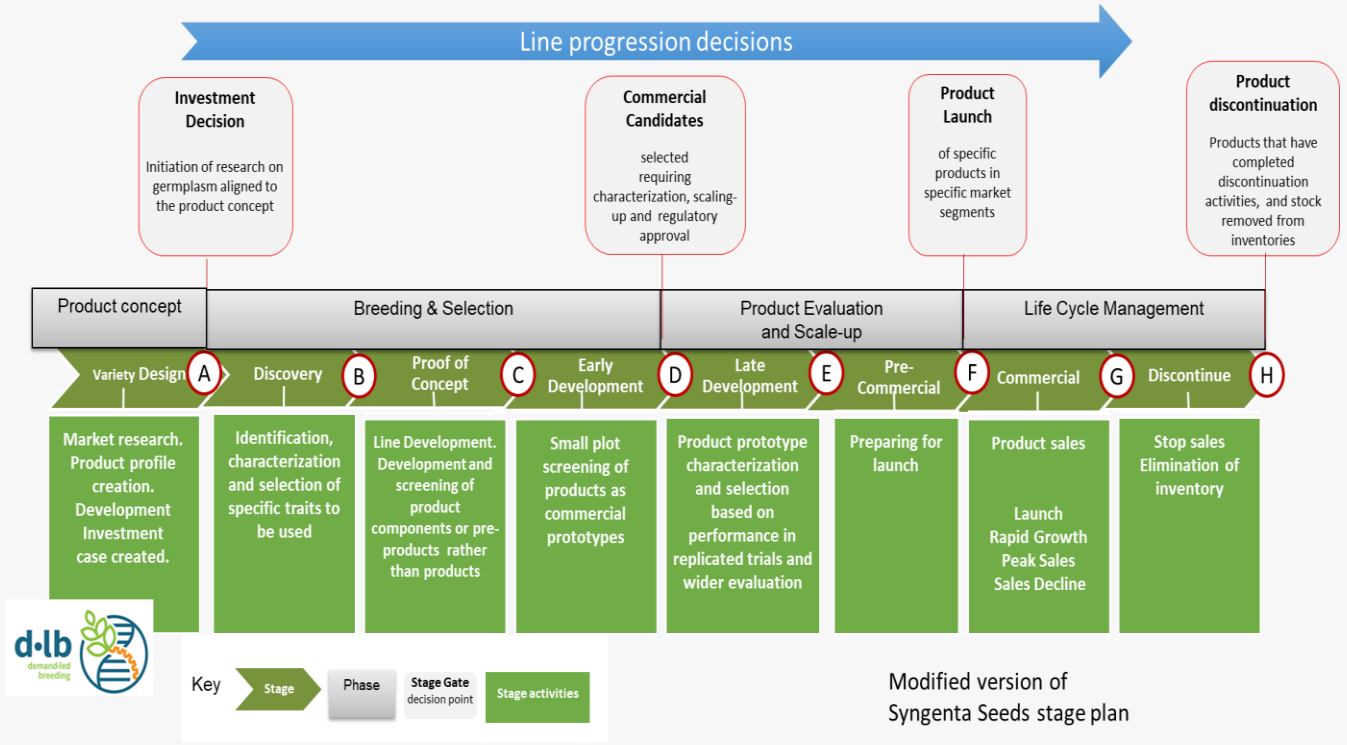


Where to Heading to After Developing the PP?

- Translate the PP into a practical breeding program with clear goals, objectives and activities

  *Stage gate system

- Monitoring, learning and evaluation throughout the variety development and deployment
- Update of the PP if need be



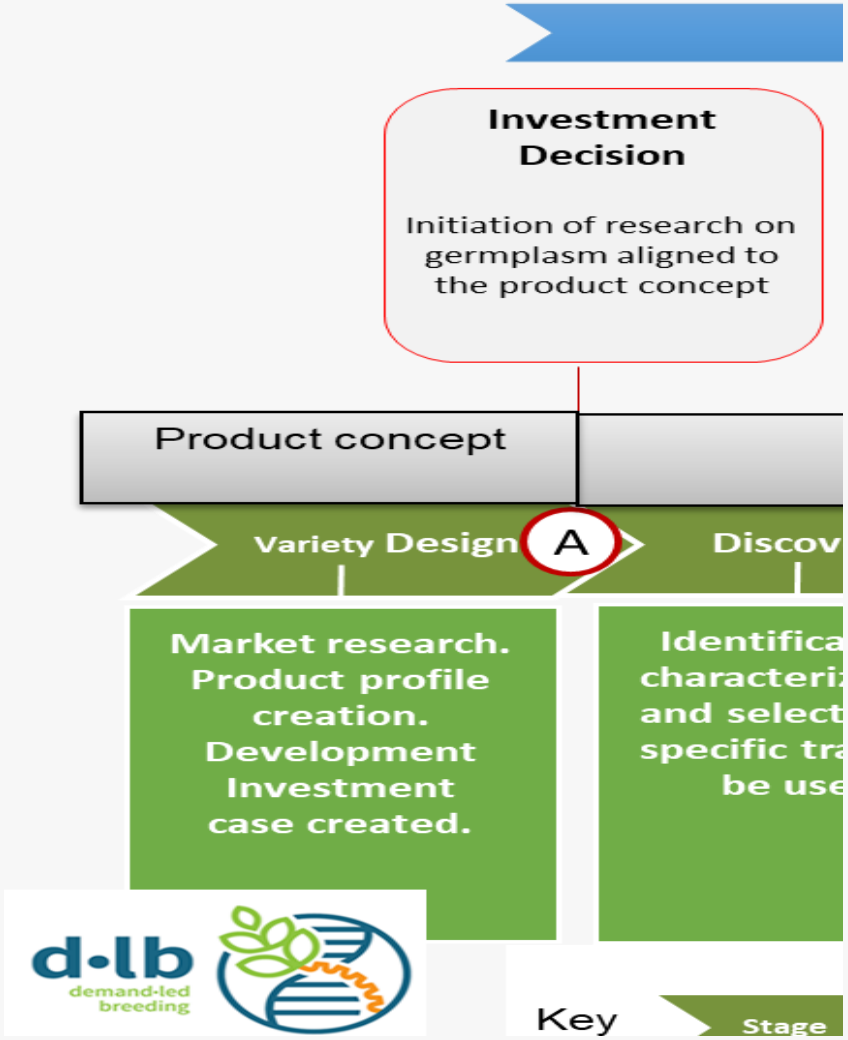
Modified version of Syngenta Seeds stage plan

Concluding remark: Product Profile Vs Product Concept

Product concept

High level thought and strategic marketing to provide the best product possible to the customer

Include variety design and product profiling as “Ideotype”



Product profile

Actual product/commodity on the market or developed or translated into breeding objectives

Seen as a key activity contributing to the product concept

Acknowledgements

THANK YOU

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