

DLB Product Profile – High-yielding hot-set tomato hybrid (Benin)



Mathieu A. T. Ayenan

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Design target

Higher yielding tomato hybrid with superior adaptation and fruit set in hot weather.

Mathieu Ayenan is a PhD scholar in tomato breeding at WACCI, University of Ghana. He is in his third year and working towards graduating in 2022. His research focuses on "Improvement of heat tolerance in tomato for the West Africa market" and especially for his home country, Benin. He developed his first set of hybrids at the WACCI research farm and continues with crossings, evaluation, and selection of inbred lines in Benin. This work follows his MPhil in genetics and plant breeding on the diversity and cultivation of pigeon pea (*Cajanus cajan*) in Benin. After graduating his goal is to join a public or private breeding organization to continue his research on tomatoes and release improved heat-tolerant and other market-driven varieties.

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Product Profile design team

Step 1		
PP Design Team Lead/Champion		Mathieu A.T. Ayenan
		University of Ghana, West Africa Centre for Crop Improvement (WACCI)
PP Design Team		
Person	Area of Expertise	Name of organization
Mathieu A.T. Ayenan	Tomato breeding	WACCI (Ghana)
Leander Dede Melome	Tomato breeding	WACCI (Ghana)
Rosemary Kusi-Adjei	Tomato breeding	WACCI/Biotechnology and Nuclear Agriculture Research Institute (Ghana)
Pamela Afokpe	Vegetable breeding	East-West Seed Company (Benin)
Ken Kounouewa	Agricultural economics, Market analysis	University of Abomey-Calavi (Benin)
Consultation with tomato consumers (25) and retailers (7) in the municipalities of Abomey-Calavi and Zè		

Clients and markets

Step 2	
Product profile descriptors	
Product profile name	High-yielding hot-set tomato hybrid
Crop	Tomato
Country	Benin
Geographic regions	Alibori, Atacora, Collines, Mono, Ouémé, Atlantique
Target market segment and positioning	Fresh tomato market. High yielding hybrid with superior adaptation to hot growing conditions
Name of target variety to be replaced	Akikon Strength: Moderate fruit set under heat Weakness: Susceptible to southern blight, bacterial wilt and small fruit (<30 g)
Date PP created	18.06.2020
Target client and use	
Value chain primary clients/customers	Farmers, transporters, consumers, seed producers
Market scale	Households, local, regional markets
Use	Food (sauces, soups, salads)
Type of processing	None – fresh market
Market class	Medium to large oval tomato
Target crop producers and production system	
Number of farmers	1000–2500 (20–30% grow hybrids)
% ratio: male to female farmers	60–80% male:20–40% female
Production system	Off-season, open field with irrigation
Area of production system	300–700 ha
Growth habit	Determinate (bushy tomato)
Expected level of inputs	Medium use – fertilizers and protection
Typical yield range of target system	5–35 t/ha
Cropping system	Rotated intercrop with cereals or other vegetables
Mechanisation	Adapted to mechanized weeding
Agroecological zones	Guinean, Sudano-Guinean and Sudanian climatic zones
Total seed market	12–30 kg

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	Economic yield	Weight of marketable fruits > 35 (t/ha)	Akikon	>
			All	1	Fruit weight	Average fruit weight – minimum 60 g	Platinum F1	≥
		Biotic stress resistance	All	4	Bacterial wilt tolerance	1–9 scale: moderate (6)	PADMA F1	≥
			All	1	Root-knot nematode (Mi-1) tolerance	1–9 scale: high (7)	AVTO1424	=
		Abiotic stress tolerance	All	4	Heat tolerance	Minimum 50% fruit set at average daily temperature > 30C	Akikon	>
	Crop management and harvesting	Plant architecture	All	1	Plant height, stem branching and canopy	Semi-erect, plant height of 100–150 cm, good leaf coverage	Diva F1	=
	Market value and price	Fruit size	All	3	Individual fruit weight	Average minimum 60g	Platinum F1	≥
		Crop duration	All	1	Early maturation	Sowing to maturity of earliest fruits – 85 days	PADMA F1	=
	Post-harvest storage	Storage-life	All	3	Commercial shelf-life	Harvesting breaking stage to sale – minimum 15 days storage	Diva F1	=
Transporter	Durability and cost	Transportability	All	3	Firmness	Penetrometer or hand pressure test – very firm	Diva F1	≥
Retailer	Sales and profit	Shelf-life	W	3	Shelf-life without refrigeration	Purchasing to use – minimum 7 days	Diva F1	≥
Consumer	Satisfaction	Taste	All	3	Organoleptic properties	Acidity/brix – tasting panel test	Tounvi	≤
		Appearance	W	3	Fruit color	Color of pericarp and flesh – deep red	Tounvi	=
			W	3	Fruit shape and uniformity	Smooth – oblong, oval, square-round	Diva F1	=
		Shelf-life	W	3	Fruit deterioration	Minimum 7 days from purchase to fungal decay	Pectomech	≥
Seed material producer	Scalability and cost*	Seed numbers	All	1	Number of seeds in a fruit	Minimum 25–30 seeds from successful cross	CLN1621L	≥
		Reproductive fertility	All	1	Pollen viability (male parent)	Proportion of viable pollen	Diho	>
			All	1	Crossing performance (female parent)	% crosses producing fruit – minimum 80%	CLN1621L	=

* Major driver for profitability of hybrid production



Excellent fruit set under heat stress



Fruit grading

"What's the true value of a variety? Working with Product Profiles (PP) has really changed my answer. What matters is what the client prefers. PP have become the compass for our breeding programs."