

High yielding, high Fe and Zn and disease tolerant red mottled bean variety for Zimbabwe



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Design target

High yielding, high Fe and Zn and disease tolerant red mottled bean variety for Zimbabwe

Shylet is currently employed by the Ministry of Lands, Agriculture, Fisheries, Water and Rural Resettlement, based at Harare Research Centre. She heads the bean programme at the Department of Research and Specialist Services, Zimbabwe. She has over five years' experience as legume breeder (common beans and cowpea) and has worked extensively with farmers, national and international organizations. Her work focuses largely on bean value chain actors' preferences, and her goal is to improve livelihoods especially for women farmers and value chain actors in Zimbabwe as a way to improve family health and wellbeing. Shylet obtained her BSc in Crop Science from University of Zimbabwe in 2013 and currently doing an MSc in Plant Breeding. She is a Gender Responsive Plant Breeding (GREAT) fellow and is implementing and training other colleagues on using the Gender+ customer and product profile tools.

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Product Profile design team

Step 1

PP Design Team Lead/Champion	Shylet Tsekenedza
	Department of Research and Specialist Services, Zimbabwe

PP Design Team

Person	Area of Expertise	Name of organization
Shylet Tsekenedza	Breeder	Department of Research and Specialist Services
Rowland Chirwa	Breeder	Pan Africa Bean Research Alliance, Malawi
Shumirai Muhera	Pathologist	Department of Research and Specialist Services
Nyarai Chisrochegwe	Gender expert	Department of Research and Specialist Services
Eileen Nchanji	Gender expert	Pan Africa Bean Research Alliance, Kenya
Chiwawa Andrew	Socio-economist	Department of Research and Specialist Services
Freeman Gutsa	Socio-economist	Department of Research and Specialist Services
Johnathan Hodzi	Agronomist	Department of Research and Specialist Services
Fungai Kunaka	Nutritionist	Department of Agricultural, Technical and Extension
Sakile Kudita	Nutritionist	HarvestPlus, Zimbabwe
Linda Murinda	Processor	Cairns Holdings Limited, Zimbabwe

Step 2

Product profile descriptors	
Product profile name	High yielding, high Fe and Zn and disease tolerant red mottled bean variety
Crop	Dry common beans (<i>Phaseolus vulgaris</i> L.)
Country	Zimbabwe
Geographic regions	Southern Africa
Market segment and positioning	rural and urban consumers
Name of target variety to be replaced	NUA45 Strength: High yielding, high Fe and Zn, fast cooking, early maturing and disease tolerant Weakness: Pod shattering, post-harvest physiological deterioration (storage) and threshability
Date PP created	17. 04.2022

Target client and use	
Value chain primary clients/customers	Rural farmers, traders, food processors, urban and rural consumers, canning companies, seed companies, schools, hospitals, prisons, non-governmental organizations
Market scale	Households, local, regional, national and international markets
Use	Food
Type of processing	Dried, cooked, canned and milled or ground into flour
Market class	Calima (large red mottled)

Target crop producers and production system	
Number of farmers	40000
% ratio: male to female farmers	61% female and 39% male
Production system	Open field (+- irrigation)
Area of production system	8000 ha
Growth habit	Bush
Expected level of inputs	Medium
Typical yield range of target system	0.5 t/ha
Cropping system	Monocrop and rotated intercrop
Mechanization	Land preparation, sowing, weeding, and harvesting are mainly manual
Agroecological zone(s)	1,2,3,4
Total vegetative propagation material market	850 MT

Variety technical specification

Step 3

Client/customer	Driver	Trait category	Gender implications for preference group: Women (W) Men (M) Youth (Y) All (W+M+Y)	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	Household consumption (women) and surplus for selling at national and regional markets for All . Men and women also prefer varieties with many pods for higher seed multiplication ratios	1	High yield	Dry grain weight > 0.8 t/ha	NUA45 - Yield of 2.9 t/ha	>3.2T
		Agronomy	Tolerance to pod shattering. Increases drudgery for Women farmers who are picking grain from the ground.	1	Pod shattering	Absence of pod dehiscence	Gloria (No pod shattering)	Equal or better
			All prefer early maturing variety	1	Early Maturing	Ability of variety to mature in less than 85 days	NUA45	=<85 days
			Women and Men farmers prefer varieties performing well under low N conditions to save cost on production	1	Low N requirement	Ability of variety to perform well under low N conditions	BILFA LINE	Equal or better
			Seed quality. Women farmers save grain as seed from first harvest after and prefer varieties that have high quality storable seed for continues use	1	Seed quality	Good seed appearance score of 4	NUA45	Equal or better
		Biotic stress resistance	Tolerance to Angular Leaf Spot. Reduces labour and costs on fungicide application for All (farmers)	1	Tolerance to Angular Leaf Spot	Ability of variety to limit the impact of ALS	Sweet Violet (score of <2)	<2 score
			Tolerance to Common Bacterial Blight. Reduces labour and costs on fungicide	1	Tolerance to Common	Ability of variety to limit the impact of CBB	Sweet Violet (score of <2)	<2 score

			application for All farmers		Bacterial Blight			
		Abiotic stress tolerance	Drought tolerant varieties preferred mostly by men (to reduce crop losses and cost of irrigation)	1	Drought tolerance	Exhibition of minimal grain yield reduction when exposed to drought	Sweet William	=, >
	Crop management and harvesting	Plant architecture	Determinate bush is preferred by All farmers	1	Bush type	Determinate growth habit, terminal bud reproductive, stems and branches erect or prostrate, pods distributed along the length of the stem	NUA45	=
	Market value and price	Grain weight	Men and youths prefer large seeded size varieties because less quantities are required to fill a given volume of a sack/bag – especially as they are involved in regional markets	1	Seed density (seed size) and grain colour	Average 100-seed weight	NUA45 (> than 45 grams per 100 seeds)	> 45grams per 100 seeds
		Crop duration	Early maturing variety preferred by All farmers	1	Earliness	<85 days	NUA45	=<85days
	Post-harvest storage	Storage-life	Long shelf life preferred by All farmers for household consumption and sale	Nice to have	Grain storage time	Presence of arceline gene	MAZ 200	Equal or better
		Threshability	Women mentioned that they prefer varieties that are easy to thresh to reduce drudgery	1	Easy and good threshability	>75% threshing recovery	Gloria	=/ better
Processor	Raw material quality specification	Cooking	Fast cook. Saves on energy and time spent on cooking especially for women	3	Cooking time	Fast cook (time taken for the grain to be tender)	NUA45 (50 minutes)	Equal or less than 50 minutes
		Nutrition	Men and women processors require biofortified beans to meet the requirements of the mandatory food fortification policy that was launched in 2015	1	High seed Fe and Zn content	Grain Fe and Zn density	Jasmine (85 ppm Fe and 40 ppm Zn)	>, =85ppm Fe and >= 45ppm Zn
		Milling	Men and women processors require bean with good grain milling efficiency	1	Grain milling efficiency	Acceptable flour for baking and 95% milling efficiency	NUA45	Equal or better
Retailer	Sale and profit	Shelf life	Men and women retailers require beans with 9 months best before and stable for 3 years	1	Long shelf life	Long shelf life of greater than 9 months	Teabus	= or better
		Transportation and storage	Clean seed with bruchid resistance	Nice to have	Bruchid resistance	Presence of arceline gene	MAZ 200	Equal or better
Consumer	Satisfaction	Taste	Sweet taste is preferred for household consumption by All	Nice to have	Palatability	Sweet taste, thick stew/broth	NUA45 (sweet taste)	Equal or better
		Appearance	Women always associate large red mottled varieties to NUA45 which is fast cooking and highly palatable (sweet taste, thick soup)	Nice to have	Large red mottled grain	Good appearance, glossy and large red mottled	NUA45	Equal

		Food preparation	Fast cook. Saves on energy and time spent on cooking especially for women	3	Cooking time	Fast cook (time taken for the grain to be tender)	NUA45 (50 minutes)	Equal or less than 50 minutes
		Shelf life	Men and women retailers require beans with 9 months best before and stable for 3 years	1	Long shelf life	Long shelf life	Teabus	= or better
		Nutrition	Men and women processors require biofortified beans to meet the requirements of the mandatory food fortification policy that was launched in 2015	1	High Fe and Zn content	Grain Fe and Zn density	Jasmine (85 ppm Fe and 40 ppm Zn)	> 85ppm Fe and > 45ppm Zn
Seed/vegetative material producer	Scalability and cost	Seed number	Men and women farmers require a pod with 8 seeds or more	Nice to have	Seed number per pod	8 seeds/pod	Sweet Violet	Equal or better
		Fertility	Men and women farmers require beans with less fertiliser requirements to reduce cost and labour	Nice to have	Fertiliser requirement	Ability of the variety to perform well in low soil fertility	Gloria	Equal or better
Seed distributors	Variety identification	Unique appearance	Men and women distributors require beans with good seed colour	Nice to have	Seed brilliance	Large red mottled, glossy	NUA45	Equal or better

NUA45



SWEET WILLIAMS



GLORIA



SWEET VIOLET



“The G+ customer and product profile tools can enable breeders to design varieties that suits the needs and preferences of its customers, by developing the right products for the right customers”