

High yielding, submergent tolerant rice varieties for Northern, Savannah, North East, Upper East, Upper West, Volta and Oti regions in Ghana



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Design target

Developing of high yielding, Submergent tolerant rice varieties in Ghana.

Alex Yeboah is a Principal Technologist at the CSIR-Savanna Agricultural Research Institute (SARI) and currently pursuing his PhD studies at the West Africa Centre for Crop Improvement (WACCI), University of Ghana. His project work focuses on developing submergent tolerant varieties for use by farmers along flood prone areas. Mr Alex works with the rice improvement division of the CSIR-SARI and he played a significant role during the release of four rice varieties in 2020 in Ghana. Alex has co-authored six publications to his credit.

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Product Profile design team

Step 1

PP Design Team Lead/Champion	Alex Yeboah
	CSIR-Savanna Agricultural Research Institute (SARI), Ghana

PP Design Team

Person	Area of Expertise	Name of organization
Dr. Samuel Oppong Abebrese	Rice Breeding	CSIR-Savanna Agricultural research Institute (SARI)
Dr. Edward Martey	Agricultural Economics	
Dr. Mrs. Flora Christine Amaglo	Food and Nutrition	
Linda Coffie	Seed Science	
Alhassan Haruna Yemyoliya	Agronomy	
Ebenezer Asamani	Field Technical Officer	West Africa Centre for Crop Improvement (WACCI), University of Ghana.
Prof. Eric Danquah	Plant Genetics	
Prof. Isaac Asante	Plant Breeding	
Dr. John Eleblu	Plant Biology	Dept of Agriculture, Tamale
Mr Seidu Rauf	Agriculture Extension	

Step 2

Product profile descriptors	
Product profile name	Submergent tolerant Jasmine 85 and Agra rice variety for flood prone farming
Crop	Rice [<i>Oryza sativa</i>]
Country	Ghana
Geographic regions	Northern, Savannah, North East, Upper East, Upper West, Volta, and Oti.
Market segment and positioning	Crop production markets. Higher yields with submergent tolerant varieties
Name of target variety to be replaced	Jasmine 85 and Agra Rice Strength: Both are high-yielding, aromatic and highly adopted Weaknesses: Both are susceptible to flood stress
Date PP created	04 May 2023

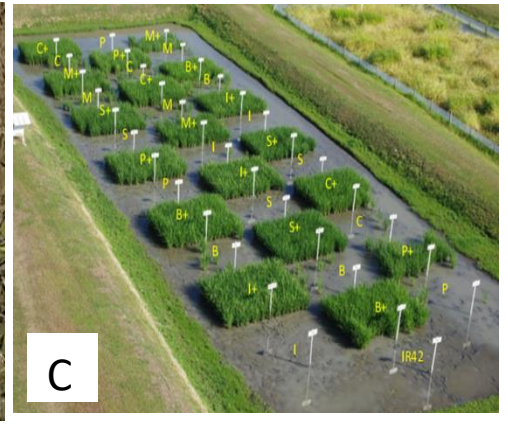
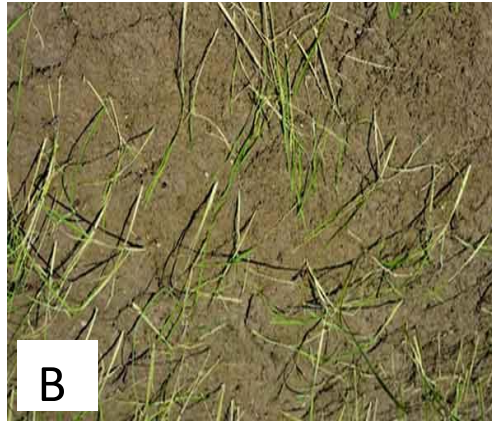
Target client and use	
Value chain primary clients/customers	Farmers, seed companies, processors, and consumers are the main beneficiaries of rice seeds, grain or rice products and by-products
Market scale	Households, local, regional, national and international markets
Use	Seeds for planting and grain for food
Type of processing	Cleaning and bagging (seed), milled (parboiling or straight milling)
Market class	Flood prone rice farming markets

Target crop producers and production system	
Number of farmers	400,000 – 1,000,000
% ratio: male to female farmers	70 to 75 males and 25 to 30 females
Production system	Open field (with or without irrigation)
Area of production system	100,000 - 150,000 (ha)
Growth habit	Long duration maturity
Expected level of inputs	Recommended good agronomic practices (GAPs)
Typical yield range of target system	4 - 8 t/ha
Cropping system	Continuous monocropping
Mechanization	Planting, maintenance and harvesting
Agroecological zone(s)	Sudan, guinea and coastal savannah

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	> 4 (t/ha)	Jasmine 85 Agra rice	= / > = / >
			Biotic stress resistance	All	1	Bacterial leaf blight	Scale: 0 – 9 (7 been moderate)	Jasmine 85 Agra rice
		All		1	Blast	Scale: 0 - 9	Jasmine 85 (susceptible to drought) Agra rice (moderately resistant)	> = / >
		All		1	Rice yellow mottle virus	Scale: 1-9	Gigante	=
		Abiotic stress tolerance	All	1	Drought tolerance	Medium tolerance at flowering and after flowering	Jasmine 85 (highly susceptible) Agra (medium tolerance)	> = / >
			All	4	Submergent tolerance	Scale 0-5 (5 been highly tolerant)	Swarna sub1	= / >
	Crop management and harvesting	Plant architecture	All	1	Semi-erect type	Good for mechanization	Jasmine 85 Agra	= =
	Market value and price	Grain weight	All	1	Good filled grain per panicles	Grain weight with high productivity	Jasmine 85 Agra	= =
		Crop duration	All	1	Late maturing	Late maturing	Jasmine 85 Agra	= =
	Consumer	Satisfaction	Cooking quality	W	1	Good cooking quality	Consumer preference	Jasmine 85 Agra
Amylose content			W	1	Good amylose content	Class High > 24% Medium 20-24% Low 10-19% Waxy <5%	Jasmine 85 (Medium) Agra (low)	= = / >
Aroma			W	1	Palatability	Assess through consumer tasting	Jasmine 85 Agra	= =
Seed producer	Scalability and cost	Seed genetic viability	All	1	Seed germination	95% viability	Jasmine 85 Agra	= =
		Ease of propagation	All	1	Direct planting or transplanting	95% uniformity	Jasmine 85 Agra	= =
Processor	Raw material quality specification	Milling	All	2	Milling recovery rate	Percentages of white rice over paddy	Jasmine 85 (65%) Agra (70.4%)	= / > = / >



Flooded experimental trials for submergent tolerant varieties, (A), and (B) shows susceptibility to flooding, (C) benchmark submergent tolerant variety which survived under flooded conditions

“Demand-driven breeding is empowering African breeders to develop rice varieties tailored to the preferences of farmers and consumers, while also being adaptable to the challenges posed by climate change, thereby increasing adoption rates”