

(5b) Breeding resistant plantain varieties: New breeding program to develop improved AAB plantain varieties	
Countries	18 (8 African countries, 1 Asian country, 9 LAC countries) where plantains are widely grown.
Cultivar groups considered	1 Since efforts to develop high-yielding varieties resistant to major pests and diseases (specifically nematodes, weevils, and BLS) are focused on AAB plantain , only production area currently grown with this cultivar group was considered.
Current and likely future spread	The biotic constraints addressed through the resistant varieties are very widespread in the target domain, so it was assumed that 100% of the plantain area in the included countries is currently affected by the constraints and will continue to be affected over the next 25 years without major intervention.
Benefits: - Increase in yield - Reduction in postharvest losses	90% 25%
Production costs	Increase of 20-30% due to more expensive seed, but scale effects due to increased availability and thus lower costs per unit seed, assuming that more labs will be operating at the time the improved material will be available for introduction. In-vitro propagated seedlings currently much cheaper in LAC and Asia at \$0.2-0.4 per piece compared to \$1-2 per piece in Africa.
Adoption ceiling	20- 80% of the target domain in all included countries 3-55% of the total national production area Since material available from a new breeding effort would perform better than the release of existing material and would not contain the banana streak virus (BSV), it was considered reasonable to assume a higher adoption ceiling.
Research period	9 years
Technology release	Adoptable varieties would be available to farmers in 17 years (the existing improved material would be subjected to 4 years of multi-locational testing and 3 subsequent years of on-farm testing)
Time from first adoption until estimated adoption ceiling will be reached	8-15 years depending on the country
Probability of success (up-take of technology)	40-80% The probability of success is moderate to high and mainly driven by the research and extension capacity and infrastructure in the respective country.
R&D costs	US\$19.65 million
Additional country-level costs	US\$19.65 million (matched 1:1 with R&D costs)
Resource persons	Rony Swennen (EAHB, plantain); Frédéric Bakry (plantain, sweet acid), Edson Perito Amorim (sweet acid)

New plantain breeding program (NEW) and Release of existing 2nd generation plantain hybrids (RELEASE)

Country	Production Area ('000 ha)	Share of Plantain = Target Domain (% of total area)	Current Spread of Constraint (% of target domain)	Spread of Constraint in 25 Years without Major Intervention (% of target domain)	Adoption Ceiling NEW (% of target domain)	Adoption Ceiling RELEASE (% of target domain)
Cameroon	184.41	58.75	100.00	100.00	60	50
Congo	20.93	77.48	100.00	100.00	20	10
DRC	391.62	64.54	100.00	100.00	20	10
Gabon	25.37	86.71	100.00	100.00	40	30
Ghana	191.75	87.61	100.00	100.00	60	50
Cote d'Ivoire	411.19	91.20	100.00	100.00	60	50
Liberia	27.75	81.98	100.00	100.00	20	10
Nigeria	455.55	82.61	100.00	100.00	60	50
India	1,858.28	9.33	100.00	100.00	30	20
Brazil	498.45	6.50	100.00	100.00	80	70
Colombia	461.43	71.79	100.00	100.00	70	60
Costa Rica	61.22	14.70	100.00	100.00	80	70
Ecuador	266.88	37.47	100.00	100.00	60	50
Honduras	30.56	26.91	100.00	100.00	50	40
Mexico	86.06	18.59	100.00	100.00	70	60
Nicaragua	14.46	59.26	100.00	100.00	40	30
Panama	15.35	50.34	100.00	100.00	50	40
Venezuela	79.79	59.89	100.00	100.00	50	40

Source: Production from FruiTrop (2010); threatened and affected area and adoption ceiling estimates from resource persons.

New plantain breeding program (NEW)

Country	Adoption Ceiling (% of total area) (At_{max})	Years to First Adoption (t_0)	Years to At_{max}	Yield Increase (%)	Reduction in Postharvest Losses (%)	Change in Input Costs (%)	Probability of Success (%)
Cameroon	35	17	10	90	25	30	70
Congo	15	17	15	90	25	30	60
DRC	12	17	15	90	25	30	60
Gabon	35	17	10	90	25	30	60
Ghana	53	17	10	90	25	30	80
Cote d'Ivoire	55	17	10	90	25	30	80
Liberia	16	17	10	90	25	30	60
Nigeria	5	17	10	90	25	30	80
India	3	17	15	90	25	20	60
Brazil	5	17	8	90	25	20	60
Colombia	50	17	8	90	25	20	50
Costa Rica	12	17	8	90	25	20	60
Ecuador	22	17	8	90	25	20	50
Honduras	13	17	8	90	25	20	40
Mexico	13	17	8	90	25	20	40
Nicaragua	24	17	8	90	25	20	40
Panama	25	17	8	90	25	20	40
Venezuela	30	17	8	90	25	20	40

Source: Expert estimates.