Agro-morphological characterization of traditional African vegetables cultivated in the highlands of Madagascar

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INTRODUCTION

- ✓ Vegetables take an important place in the cropping system of the Malagasy agriculture characterized as a subsistence farming.
- ✓ Traditional African Vegetables (TAVs) are easy to grow, have high levels of micronutrients and could be an important income source for the farmer households.

> On-station characterization of TAVs accessions at the FOFIFA's research station in Antsirabe, Region of Vakinankaratra (highland of Madagascar) to evaluate their adaptation and to multiply these seeds for distribution to farmers.

MATERIALS AND METHODS

- ✓ **12 accessions of Traditional African Vegetables** :
  - 4 African Nightshade : 1 *Solanum villosum* (V1) , 3 *Solanum scabrum* (V2, V3, V4)
  - 5 Amaranth : 3 *Amaranth cruentus* (V5, V8, V9), 1 *Amaranth hypochondriacus* (V6), 1 *Amaranth dibius* (V7)
  - 1 African eggplant : *Solanum aethiopicum* (V10)
  - 2 Ethiopian mustard : *Brassica carinata* (V11, V12)
- ✓ **Site description**: ferrallitic soil, slope of field less than 1%.
- ✓ **Experimental design**: Randomized complete block design with three replications in 2019/2020 season at the FOFIFA's research station in Antsirabe (1500 m asl.).

RESULTS

- ✓ The effect of accession were highly significant for all traits (Table 1)
- ✓ For Days to 50% flowering, a significant interaction between accession and replication was observed

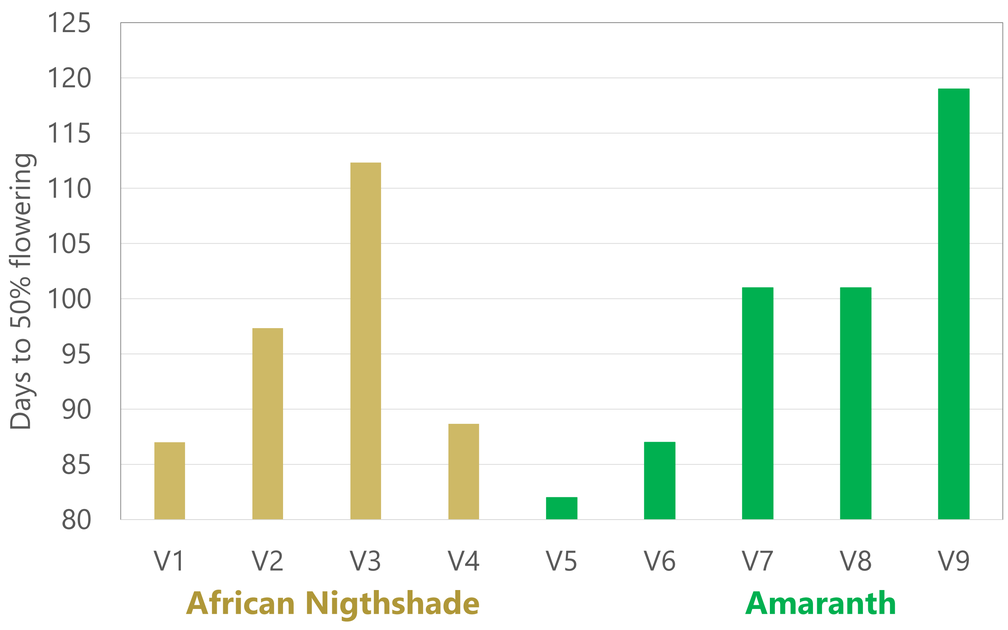

Fig. Days to 50% flowering of four accessions of African nightshade and five accessions of Amaranth

- ✓ V1 was the shortest, had small leaves and yielded few biomass compared to V2, V3, V4 accessions (Table 2).
- ✓ The early flowering accession V5 recorded the highest biomass yield (mean of 1407.8g/plant) than the four other accessions

Table 1. F-values and significance of the variance components of the factorial design combining accession and replication of agronomic and morphologic traits

Trait	African Nigthshade			Amaranth		
	Accession	Replication	Accession * Replication	Accession	Replication	Accession * Replication
Days to 50% flowering	46.17 ***	6.36 *	19.90 ***	3.19E29 ***	1.02 ns	0.87 ns
Plant height	17.84 ***	5.83 *	2.44 ns	12.44 ***	0.05 ns	1.13 ns
Leaf length	263.83 ***	0.29 ns	0.61 ns	87.40 ***	1.13 ns	0.58 ns
Leaf width	334.06 ***	0.42 ns	0.36 ns	99.84 ***	0.14 ns	0.95 ns
Biomass Yield	32.75 ***	0.17 ns	0.87 ns	6.19 ***	11.58 ***	3.97 **
Degree of fredom	3	1	3	4	1	4

***; **, * : F values significant at the 0.001, 0.01 and 0.05 probability levels, respectively. ns = non-significant at P = 0.05.

- ✓ For African Nightshade, V1 and V4 were the early flowering accessions and V3 was the latest.
- ✓ For Amaranth, there were 37 days between the flowering time of V5 (the early flowering accession, 82 days) and V9 (the late flowering accession, 119 days).

Table 2. Mean value per accession of agronomic and morphologic traits

Accession	African Nightshade				Amaranth				
	V1	V2	V3	V4	V5	V6	V7	V8	V9
Days to 50% flowering	87.0	97.3	112.3	88.7	82.0	87.0	101.0	101.0	119.0
Plant height (cm)	46.4	70.1	69.6	57.7	105.3	91.4	101.4	108.0	78.7
Leaf length (cm)	5.7	18.0	18.3	19.1	19.3	12.3	16.0	22.2	18.8
Leaf width (cm)	3.1	12.2	12.4	13.4	10.6	7.1	10.8	5.0	9.6
Biomass Yield (g)	571.1	800.3	821.4	855.8	1407.8	1249.6	1287.7	1332.3	1279.8

DISCUSSION

- ✓ Flowering time is an important trait, especially for leafy vegetables. Days to 50% flowering time of African nightshade was generally long (more than 87 days) while the mean obtained by Stoilova et al., (2015) was short (57 days).
- ✓ Leaf yield of V1 (*Solanum villosum*) was relatively low compared to V2, V3, V4 (*Solanum scabrum*) accessions because leaf productivity was limited by prolific early flowering which is the most limiting factor particularly in *Solanum villosum* (Ojiewo et al., 2013).

CONCLUSION AND FUTURE PLAN

- There was an effect of genotype for all morphologic and agronomic traits measured on traditional African vegetable accessions.
- Days to flowering of all accessions were prolonged. , more than 80 days.
- A second trial (in 2020-2021) will be conducted to confirm the result, with a comparison between these accessions of traditional African vegetable and two local variety of traditional vegetable (African eggplant and African nightshade).

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