Evaluation of cassava interespecific hybrids for disease resistance

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Introduction

The best method to control plant disease is the use of resistant varieties. In cassava this is particularly important since most of producers are smallholder with low resources/information to acquire chemical products. In Brazil, no chemical products (insecticide/fungicide) are legally authorized to be used in cassava. Thus, methods to control cassava diseases are necessarily related to cultural practices and, mainly, to the use of resistant varieties. However, plant pathogens are highly variable and constantly new strains/races cause breakdown of resistance. Therefore, searching for new sources of resistance, such as those present in cassava wild relatives is necessary. **This work aimed evaluate cassava interspecific hybrids obtained at CIAT from different *M. esculenta* varieties and the wild species *M. flabellifollia*, *M. tristis* and *M. peruviana* for disease resistance in different production areas of Brazil.**

Seedlings of several families planted in São Miguel das Matas (SMM), Tancredo Neves (TN), Cruz das Almas (CA) in the Bahia State, and in Petrolina (PT), Pernambuco State were evaluated for disease resistance from 6 to 12 months after planting (MAP). Severity was assessed using scales from 0 - 5 class (0: no symptoms and 5: maximum level of susceptibility).

Results

In the Bahia State (TN, SMM and CA) the incidence of **anthracnose**, **brown leaf spot (BLS)**, **rust**, **diffuse leaf spot** and **white leaf spot** were observed. In Petrolina only sporadic lesions of BLS were found **(Fig. 1)**

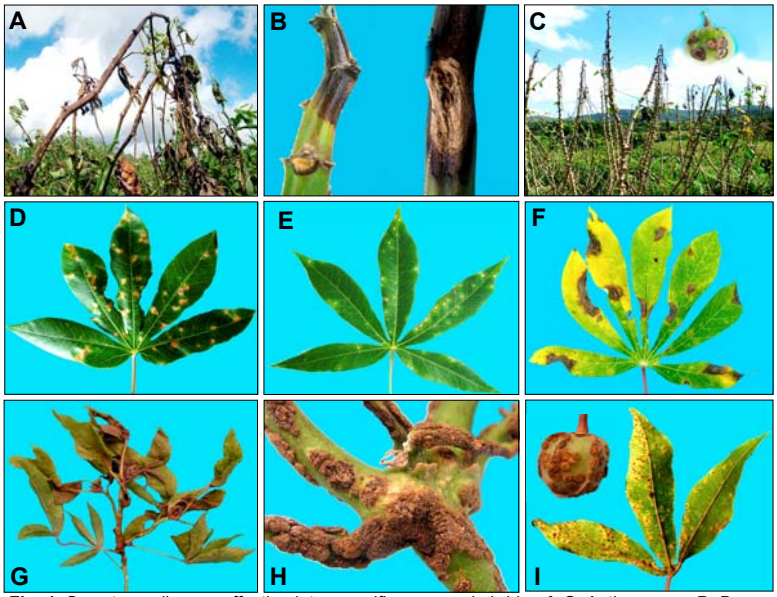

Fig. 1. Symptoms disease affecting inter-specific cassava hybrids. **A-C**: Anthracnose. **D**: Brown leaf spot. **E**: White leaf spot. **F**: Diffuse leaf spot. **G-I**: Rust.

Anthracnose, **brown leaf spot** and **rust**, in this order, were the most severe disease in Bahia. (**Tables 1, 2 and 3**). Genotypes with 100% of apical shoots affected by anthracnose, die-back, and high level of defoliation were observed. Similarly, in genotypes highly susceptible to **BLS** complete defoliation was observed. Respect **rust**, although some genotypes reached the highest class of the scale, disease intensity was lower, when compared to anthracnose and **BLS**, respectively.

Differences in the resistance levels among progenies and among genotypes of the same family were observed. Regardless of the evaluation sites, in Bahia, high variation in the resistance levels inter- and intra-families was observed. Most of genotypes with high levels of resistance to anthracnose and BLS were found in families involving *M. tristis* (**Table 1**). For **rust**, however, most of the resistant hybrids had *M. flabellifolia* as parent.

Only 8 genotypes from crosses involving ***M. peruviana*** were evaluated (4 in SMM and 4 in TN). All of them were susceptible to anthracnose and only resistance to rust was recorded.

Table 1. Disease resistance reaction of cassava interespecific hybrids evaluated at 12 MAP in different regions of Brazil

São Miguel das Matas

Family (*)	Brown leaf spot			Anthracnose			Rust			Wild species involved
	R	RI	S	R	RI	S	R	RI	S	
CW 450 (20)	0	5	15	1	1	18	12	7	1	*M. flabellifolia*
CW 452 (8)	0	0	8	0	1	7	3	1	4	*M. flabellifolia*
CW 453 (15)	1	7	7	0	0	15	11	4	0	*M. flabellifolia*
CW 464 (6)	1	4	1	0	0	6	2	4	0	*M. flabellifolia*
CW 473 (4)	0	4	0	0	0	4	2	2	0	*M. peruviana*
CW 444 (10)	0	7	3	2	3	5	6	2	2	*M. tristis*
CW 445 (13)	0	13	2	4	5	5	11	2	0	*M. tristis*
CW 482 (4)	0	3	1	0	0	4	1	3	0	*M. tristis*
CW 485 (5)	2	3	0	1	1	3	5	0	0	*M. tristis*
CW 488 (4)	0	1	3	0	0	4	0	3	1	*M. tristis*
Total	4	47	40	8	11	71	53	28	8	

Tancredo Neves

Family (*)	Brown leaf spot			Anthracnose			Rust			Wild species involved
	R	RI	S	R	RI	S	R	RI	S	
CW 450 (20)	0	0	20	0	0	20	17	3	0	*M. flabellifolia*
CW 452 (8)	0	0	8	0	0	8	3	4	1	*M. flabellifolia*
CW 453 (15)	4	1	10	0	1	14	6	9	0	*M. flabellifolia*
CW 464 (5)	0	1	4	0	0	5	4	0	1	*M. flabellifolia*
CW 473 (4)	0	0	4	0	0	4	3	0	1	*M. peruviana*
CW 444 (10)	1	1	8	1	1	8	9	1	0	*M. tristis*
CW 445 (15)	3	2	10	3	2	10	14	1	0	*M. tristis*
CW 482 (6)	1	0	5	1	0	5	3	2	1	*M. tristis*
CW 485 (5)	0	1	4	1	0	4	4	0	1	*M. tristis*
CW 488 (4)	0	0	4	0	0	4	2	2	0	*M. tristis*
Total	9	6	77	6	4	82	65	22	5	

Cruz das Almas

Family (*)	Brown leaf spot			Anthracnose			Rust			Wild species involved
	R	RI	S	R	RI	S	R	RI	S	
CW 444 (3)	2	1	0	3	0	0	0	3	0	*M. flabellifolia*
CW 450 (13)	0	3	10	2	5	6	13	0	0	*M. flabellifolia*
CW 460 (3)	0	1	2	1	2	0	3	0	0	*M. flabellifolia*
CW 533 (3)	3	0	0	3	0	0	3	0	0	*M. flabellifolia*
CW 445 (8)	7	1	0	5	3	0	3	4	1	*M. tristis*
CW 441 (5)	3	1	1	3	2	0	4	1	0	*M. tristis*
CW 453 (8)	0	0	8	1	3	4	8	0	0	*M. tristis*
CW 482 (3)	0	3	0	0	1	2	0	1	2	*M. tristis*
CW 484 (3)	0	3	0	3	0	0	2	1	0	*M. tristis*
CW 488 (3)	0	3	0	0	3	0	3	0	0	*M. tristis*
Total	15	16	21	21	19	12	39	10	3	

*[a]Values corresponds to the number of genotypes classified as **R**: Resistant (classes: 0-2); **IR**: Intermediary resistance (class 3) and **S**: Susceptible (classes 4 and 5). *Values between brackets corresponds to the number of genotypes evaluated on each progeny*

In summary, genotypes with high levels of resistance to diseases were identified in all the places evaluated. Currently, replications of the promising hybrids are planted in these places aiming to perform a more accurate evaluations and data analyses of disease resistance and agronomic traits. In addition, characterization for resistance to other diseases, such as bacterial blight, root rot and cassava mosaic veins virus will be performed in greenhouse conditions.

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