Bacterial Wilt Resistance in *Phaseolus vulgaris* L. Germplasm

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Bacterial wilt is one of the three bacterial diseases on dry bean in Bulgaria. The disease is caused by the bacterium *Curtobacterium flaccumfaciens* pv. *flaccumfaciens*. The bacterium causes stunting, wilting and death of the bean plants. The disease development is favored by hot weather and drought stress.

Breeding varieties combining resistance to common bacterial blight, halo blight and bacterial wilt is the main strategy for control of bacterial diseases on bean in Bulgaria; this strategy is incorporated in the breeding program of DAI - General Toshevo. In our preliminary study we determined several sources of resistance to individual strains of *C.f.* pv. *flaccumfaciens* (Kiryakov and Genchev, 2000). This publication presents results on the testing for resistance of elite accessions and breeding lines of dry bean to bacterial wilt.

Material and Methods

The study included 53 accessions and 33 breeding lines of beans. The plants were sown in two rows, each 2 m long, in two replications, in randomized design of the accessions in the trial field of DAI - General Toshevo. The plants were inoculated with bacterial suspension 10^8 cfu/ml from isolate CC 96212 (yellow strain) in the cotyledonary node, after removing the cotyledons at stage V_2 (Coyne et al., 1965). The last plants in the rows were injected with sterile water and used as checkers. The bacterial wilt reaction of the accessions was rated at stages R_6 and R_8 according to the following scale: 1 - no symptoms; 2 - temporary wilting of single leaves, vigorous plant growth; 3 - wilting and shriveling of single leaves, vigorous plant growth; 4 - plant moderately stunted, without wilting of leaves; 5 - a part of the old leaves wilted and/or shriveled, vigorous plant growth; 6 - part of the old leaves wilted and shriveled, plant moderately stunted; 7 - a large part of the leaves wilted and shriveled, plant moderately stunted; 8 - severe plant stunting, wilting and shriveling; 9 - plant death.

Results and Discussion

In a preliminary study variety Ludogorie showed a susceptible response to 4 *C.f.* pv. *flaccumfaciens* isolates (Kiryakov and Genchev, 2000). In this investigation variety Ludogorie was used as a susceptible checker (Figure 1). Four breeding lines and one accession had high resistance to the pathogen. Breeding lines 95-49-106-5, 95-49-106-7, 95-49-106-6, 95-49-106-8, as well as lines 95-20-28-7, 95-20-28-2, exhibiting moderate resistance to bacterial wilt, possess resistance to common bacterial blight and halo blight (Table 1). Accessions Trudovec, Oturak, C 64 and C 31 had moderate susceptibility to *C.f.* pv. *flaccumfaciens*. Under field conditions the plant growth of the accessions was moderately stunted, without wilting. The lack of wilting typical for the disease in these accessions was probably due to a different gene control of resistance to the wilt and plant stunt.

Figure 1. Response of the susceptible variety Ludogorie (left) and the resistant line 95-49-106-5 (right) to bacterial wilt under field conditions

Table 1. Bean accessions with resistance to *C.f.* pv. *flaccumfaciens* under field conditions

Accession / Line	Disease severity index at growing stage		Growth habit	Seed colour	Weight of 1000 seeds
	Flowering (R6)	Pod filling (R8)			
Ludogorie (susceptible checker)	7.8	8.0	II a	white	180
95-49-106-5	1.0	1.0	III b	white	405
95-49-106-	1.0	1.0	III b	white	411
Raikin 1	1.0	1.0	IV b	motley	340
95-49-106-6	1.1	1.3	III a	white	359
95-49-106-8	1.6	1.6	III a	white	410
Zlaten	2.0	2.0	IV a	motley	650
Gorna Ribnica 1	2.7	2.7	I a	white	505
PMB 0127	3.3	3.3	I a	white	490
Kavrakirovo 8	3.0	3.6	I a	white	465
95-20-28-7	3.0	4.0	II a	white	210
Trudovec	4.0	4.0	I a	white	495
Oturak	4.0	4.0	I a	white	470
C 64	4.0	4.0	I a	white	350
C 31	4.0	4.0	I a	white	375
95-20-28-2	4.3	4.3	II a	white	205
Damyanitza	4.5	6.0	I a	white	404

References

Coyne, D, P., M.L., Schuster, J.O. Young, 1965. A genetic study of bacterial wilt (*Corynebacterium flaccumfaciens var aurantiacum*) tolerance in *Phaseolus vulgaris* crosses and the development of tolerance to two bacterial diseases in beans. Amer.Soc.for Hort.Scienc. 87; 279-285.

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