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THE BEHAVIOUR OF DIFFERENT *PHASEOLUS VULGARIS* CULTIVARS IN THE SAME CONDITIONS

CSILLA IULIANA BĂRA, MIHAI PRICOP, ION I. BĂRA

Key words: Phaseolus vulgaris, cultivars, UV.

Abstract: It was registered big differences between *Phaseolus vulgaris* L. cultivars from Romania and from Chile. In the same conditions of field (Agriculture Station from Podu Iloaie, Iasi - Romania) the cultivars from Chile could not reach maturity. The treatment with UV during germination reduced the survival rate.

INTRODUCTION

The UV spectrum is divided, in concordance of wave length, in UV-C ($\lambda < 280$ nm), UV-B (λ 280-320 nm) and UV-A (λ 320-400 nm).

The ozone layer cut UV with λ <290 nm, (which produces mutations). The ozone layer degradation permits increases of UV-B quantity at earth surface.

The UV acts on morphological and anatomical traits, on physiological and biochemical ones and at DNA level. The plant defense mechanisms consisted of morphological modifications to reduce the quantity of rays reaching the target molecules, or in mechanisms of lesions repair at the level of DNA.

THE INVESTIGATIONS AIM

In this paper we aimed to examinee and describe the UV (administered during germination process) effects on different cultivars of bean, and to do a comparison between behavior of cultivars from Romania and Chile, in the same environment.

MATERIAL AND METHODS

It was investigated 6 cultivars of *Phaseolus vulgaris* L from Romania and 5 cultivars from Chile, in the same field conditions.

Those from Romania were investigated in two variants: as control and under treatment with UV (λ=295 nm) , for 72 hours, during germination.

RESULTS AND DISCUSSIONS

All bean cultivars were sown, in the field of Podu Iloaie Agricultural Station, on 1st May. After 10 days all started to spring. But, in time, the differences between variants become more and more evident.

The romanian cultivars were divided into two groups - irradiated and non-irradiated. In the case of Star and Vera cultivars, the spring time was two days late. The flowering end was late with 4-13 days for irradiated variants. The first pods have appeared between 17th July (Ami) and 27th July (Star) for control variants and between 25th July (Vera) and 30th July (Ardeleana, Avans) for irradiated variants. The earliest maturation end was registered at irradiated Ardeleana and the latest one at irradiated Vera. As a rule the maturation was earlier at irradiated variants.

The biggest differences between control and irradiated variants were observed for germination percent (table 2). The ratio between control and irradiated variants was

comprised between 2.03 and 4.27, the biggest ones being registered at Ami cultivar.
The shortest period of maturation was registered by control of Vera, Ami and Avans, and the longest by Vera irradiated variant

Very important, in this investigation, was the fact that, in the same conditions, the cultivars from Chile didn't arrived at maturity. The cultivars Pinto and Orfeo started to flowering but only 3-4 seeds per plant were obtained. The other three cultivars started to flowering but, after few days, the flowers disappeared.

From the point of view of seeds number per plant, the best comportment was registered of Ami and Ardeleana cultivars, on the last place being Diva cultivar.

CONCLUSIONS

In the Romanian field conditions, the comportment of cultivars from Romania was better like those from Chile.

The treatment with UV had strong influence on survival rate and on the maturation time

BIBLIOGRAPHY

Beggs, C. J., Schneider-Ziebert, U., Wellmann, E., 1986. *UV-B Radiation and Adaptative Mechanisms in Plants*. Stratospheric Ozone Reduction, Solar Ultraviolet Radiation and Plant Life, Edited by R.C. Worrest and M.M. Caldwell, NATO ASI Series, Vol. G8, Springer-Verlag Berlin Heidelberg, 235-251

Coohill, T. P., 1991. *Stratospheric ozone depletion as it affects life on eartth – the role of UV action spectroscopy*. In: Impact of global climatic changes on Photosynthesis and Plant Productivity, Editors: Abrol, J.P., Wattal, P.N., Gnanam, A., Govindjee, Ort, D.R., Teramura A.H., Oxford & IBH Publishing CO.PVT.LTD, 3-15.

Flint, S. D., Jordan, P. W., Caldwell, M. M., 1985. *Plant protective response to enhanced UV-B radiation under field conditions: leaf optical properties and photosynthesis*. Photochem. Photobiol. 41, 95-99.

Frederick, J.E., Snell, H.E., Haywood, E.K., 1989. *Solar Ultraviolet Radiation at the earth's surface*. Photochemistry and Photobiology vol. 50, Pergamon Press plc., Printed in Great Britain, 443-450.

Robberrecht, R., Cadwell, M. M., 1978. *Leaf epidermal transmittance of ultraviolet radiation and its implications for plant sensitivity to UV induced injury*. Oecologia 32, 277-287.

Sharma, Aruna, Abrol, Y. P., Sengupta, U.K., 1991. *Effect of Solar UV-B Radiation on growth of mungbean (Vigna radiata L. Wilczek) Plants,* (1991). Impact of global climatic changes on Photosynthesis and Plant Productivity, Editors: Abrol, J.P., Wattal, P.N., Gnanam, A., Govindjee, Ort, D.R., Teramura A.H., Oxford & IBH Publishing CO.PVT.LTD.

Teramura, A. H., Sullivan, J. H., 1991. *Field studies of UV-B Radiation Effects on Plants: Case Histories of Soybean and Loblolly Pine*. Impact of global climatic changes on Photosynthesis and Plant Productivity, Editors: Abrol, J.P., Wattal, P.N., Gnanam, A., Govindjee, Ort, D.R., Teramura A.H., Oxford & IBH Publishing CO.PVT.LTD, 147-159.

Wellmann, E., Beggs, C.J., Möhle, B., Schneider-Ziebert, U, Steinmeitz, V., 1984. *Plant responses to solar UV-B radiation.* Proc. 2nd European Symposium on Life Sciences Research in Space, Germany, 61-65

Cultivart	The data relating to vegetation period							
	Seed time	Spring time	Flowering time		First pods	Flowering end	Maturation time	
			10-15%	>75%			Start	End
Diva control	1.05.02	10.05.02	18 06.02	24.06.02	28.06.02	23.07.02	25.07.02	12 08.02
Diva-UV	1.05.02	10.05.02	18.06.02	22.06.02	26.06.02	28.07.02	21.07.02	10.08.02
Star control	1.05.02	10.05.02	16.06.02	21.06.02	25.06.02	27.07.02	27.07.02	14.08.02
Star-UV	1.05.02	10.05.02	18.06.02	24.06.02	28.06.02	27.07.02	21.07.02	10.08.02
Vera control	1.05.02	10.05.02	16.06.02	21.06.02	25.06.02	21.07.02	19.07.02	04.08.02
Vera-UV	1.05.02	10.05.02	18.06.02	24.06.02	28.06.02	25.07.02	19.07.02	17.08.02
Ami control	1.05.02	10.05.02	10.06.02	15.06.02	20.06.02	17.07.02	21.07.02	06.08.02
Ami-UV	1.05.02	10.05.02	10.06.02	14.06.02	16.06.02	30.07.02	19.07.02	06.08.02
Avans control	1.05.02	10.05.02	10.06.02	15.06.02	18.06.02	19.07.02	25.07.02	10.08.02
Avans-UV	1.05.02	10.05.02	10.06.02	16.06.02	19.06.02	30.07.02	19.07.02	06.08.02
Ardeleana control	1.05.02	10.05.02	18.06.02	21.06.02	26.06.02	25.07.02	25.07.02	12.08.02
Ardeleana -UV	1.05.02	10.05.02	18.06.02	26.06.02	30.06.02	30.07.02	17.07.02	03.08.02
Pinto	1.05.02	10.05.02	14.06.02	18.06.02	18.06.02	19.07.02	17.07.02	03.08.02
Orfeo	1.05.02	10.05.02	26.06.02	30.06.02	30.06.02	25.07.02	21.07.02	12.08.02
Arroz	1.05.02	10.05.02	18.06.02					
Vilmorin	1.05.02	10.05.02	03.07.02					
Tortola	1.05.02	10.05.02	01.07.02					

Table 1. The data relating to vegetation time.

The variant	The percent of plants appeared on 15.05.02	Number of nonirradiated/ number of irradiated plants appeared on 15.05.02
Diva control	53%	2.03
Diva UV	26%	
Star control	76%	2.05
Star Uv	37%	
Veracontrol	40%	2.85
Vera UV	14%	
Ami control	94%	4.27
Ami UV	22%	
Avans control	96%	2.32
Avans UV	38%	
Ardeleana control	81%	2.53
Ardeleana UV	32%	

Table 2. The percent of germination for irradiated and control variants

Cultivar	Number of days from sawn to:						Number of days of:		
	Spring	Start of flowering	Legumes formation	End of flowering	Start of maturity	End of maturity	Flower-ing	Ma-turation	Vegetation
Diva	9	48	58	83	85	103	35	18	124
Diva UV	9	48	56	88	81	101	48	20	122
Star	9	46	55	87	87	105	41	18	124
Star UV	9	48	58	87	81	101	48	20	122
Vera	9	46	55	81	79	95	35	16	116
Vera UV	9	48	58	85	79	108	44	29	129
Ami	9	40	50	77	81	97	37	16	117
Ami UV	9	40	46	90	79	97	51	18	118
Avans	9	40	48	79	85	101	38	16	120
Avans UV	9	40	49	90	79	97	49	18	118
Arde-leana	9	48	56	85	85	103	36	18	121
Arde-leana UV	9	38	60	90	77	94	51	17	115
Pinto	9	44	48	79	78	95-	35	17	144
Orfeo	9	56	60	86	82	104	29	22	149
Arroz	9	48	58						
Vilmorin	9	63	71						
Tortola	9	61	67						

Table 3. The days number spent for different ontogenetic stages

Genotype	High of plant at flowering (cm)	High of plant (cm)	Insertion of first legume (cm)	Number of legumes	Number of seeds per legume	Total number of seeds per plant
Diva	30,00	38,88	6,50	6	3-4	23,63
Star	33,30	41,29	5,57	8-9	3-4	27,57
Vera	47,40	36,25	5,25	10-11	2-3	29,75
Ami	28,20	39,00	4,00	10-11	3-4	37
Avans	42,70	39,00	4,50	9,00	3-4	29,5
Ardeleana	25,90	44,00	6,50	10-11	3-4	37

Table 4. Some characteristics of investigated *Phaseolus vulgaris* cultivars