



**5TH INTERNATIONAL SYMPOSIUM ON
AGRICULTURAL SCIENCES**



AGRORES

2016

BOOK OF ABSTRACTS



February 29 - March 3, 2016
Banja Luka, Republic of Srpska, Bosnia and Herzegovina

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ON AGRICULTURAL SCIENCES



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ABIOTIC STRESS RESISTANCE OF GRAPEVINE CULTIVARS DEPENDING ON THEIR PROVENANCE & GENETIC ORIGIN

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For introduction of new grapevine cultivars (cvs) it is necessary to know their agrobiological parameters and to carry out preliminary assessment of their reactions to basic climatic factors (intensity of light exposure, air and soil temperature in dynamics, etc.) at the target region. For the majority of grapevines it is shown rather high warm- and light- demanding. However specially designed and created modern grapevine cvs (especially *Vitis* hybrid forms) in practice convincingly showed enough adaptability to some inclement Boreal area. In such a way some American hybrids (AH) possess the accelerated rate of development (e.g. Marquette), and managed to finish year life cycle before autumn frosts. Grapevines annual cycle consists of several phenological stages: 1) intensive sap movement ('bleeding' of vine); 2) budburst (budbreak), bunch initiation and shoots forming; 3) flowering; 4) fruit set and berry development; 5) véraison and berries maturing; 6) ripening of sprouts and fall of the leaves 8) dormancy. In northern risky zones of grapevines growing the stage 6 by *V. vinifera* cvs often are not reached because their period of vegetation is shortened (by 'cold-cut') to 145...180 days. Also in Belarus sometimes spring T-falls are happened from +15°C to +5°C – the main 'deadly' stress factor just in the beginning of intensive plant vegetation (often fatal for grape harvest). That is why we undertook the current investigation on biochemical criteria of different grapevine cvs, which allows to choose in advance the suitable that one's (i.e. resistant to unpleasant abiotic factors). We verified again that at unfavorable abiotic conditions the retardation in phenological development of the grapevine are caused by mediated biochemical effects of generated harmful reactive oxygen species and subsequent accumulation of lipids peroxidation products (among them – malondialdehyde). It was shown, that the evident genetically inherited lower biological 'zero point' of many contemporary AH-cvs (+5°C...+8°C vs. +10°C of *V. vinifera*) often allows them to resist short-term spring frost without the expressed stress. Thus, we conclude once more, that rate of phenological growth and development after abiotic stress impacts (e.g., the temperature pulldown during active vegetation) depend on the individual redox system characteristics of grape vine cvs. Our biochemical and gel-electrophoretic analyses revealed that the temperature pulldown initiates in *Vitis* plants additional activity of redox system (with expressions of appropriate ferments), in particular – isoenzymes of peroxidase (PO [EC 1.11.1.11] and superoxide dismutase (SOD [EC 1.15.1.1]) to level consequences of the abiotic stress (by mediated physiological mechanisms). The patterns of redox enzymes induction proved to be extremely sort-specific –depending on concrete *Vitis* variety. Besides, various grapevines revealed to have not only inducible (non-constitutive) PO & SOD isoforms, but also constitutive (general for all) and by means of its spectrum *Vitis* cvs can be identified and their resistance to abiotic stress factors can be predicted. In comparison with European cvs (Bianka, Krasen, Pinot Noir... – originated from *V. vinifera*) the grape vine cvs of North-American group (AH [Americans hybrids Marechal Foch, Marquette...]) demonstrate the most stress resistance at action of adverse abiotic factors on all stages of their ontogenesis.

Key words: Grapevine, Redox System, Stress Resistance