

Testing a Plant Strengthening Agent in Horticulture

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Abstract. In spring and summer 2010 three commercially available plant-strengthening agents (Myco-Sin (™), Alginure (™) und plantasalva (™)) were applied to three horticultural crops (spinach (*Spinacia oleracea*, Chenopodiaceae), pak choi „Tatsoi“ (*Brassica rapa* var. *chinensis*, Brassicaceae) and zinnia „Perserteppich“ (*Zinnia angustifolia*, Asteraceae)). The plot was arranged randomly in three replicates. Canopy parameters, quality and amount of yield and physiological parameters like chlorophyll content, nitrate- potassium- and ascorbate contents were measured. The trials health-status (pests, diseases) were monitored on open field. The effects were analyzed and shown in tables and graphs (Djufri, 2010). Foremost in the case of Planta salva a fertilization-effect is supposed. Trials will be carried on, modified and in more detail with an emphasis on the physiology of systemic resistance.

Keywords: organic horticulture, bio-industrial products, plant strengthening agent, quality research

INTRODUCTION

"Plant strengthening agents" are legal under current understanding, and no pesticides and fertilizers actually no, but are still treated by the fertilizer law. In horticulture, especially vegetables, they are increasingly being tested as a means of production and use. In organic production systems, they are increasingly taking an important position in health maintenance and production quality of the harvested products. Mission and goal of this work was to effects of plant tonic Myco-Sin (™), Alginure (™) and implantation salva (™) strengthening respectively different effect on selected crop species to plant health, yield and quality parameters as part of a master's thesis in international Erasmus Mundus Master Programme "International Master in Horticultural Sciences" to consider.

MATERIALS AND METHODS

Years, plant species: There were attempts in 2010 of spinach (*Spinacia oleracea*, Chenopodiaceae), pak choi cv. "Tatsoi" (*Brassica rapa*, Brassicaceae) and zinnia cv. "Persian Carpet" (*Zinnia angustifolia*, Asteraceae) conducted for testing and documentation.

Location: The location of the Department Jedlersdorf (1221 Vienna, Gerasdorferstr.105). Altitude 162 m above sea level, mean annual temperature is 9.8 °C, mean annual precipitation 500-600 mm average, annual sunshine duration is 1800 h. There is a very windy location. The test facility is located in western parts of the Pannonikums. The soils are sandy-loamy to loamy-sandy, partially degraded chernozem on Danube gravels. The thickness of gravel may be only 0.75 m. The soil reaction is slightly alkaline. The irrigation is from groundwater wells on a jet-pipe system. The horticultural experimental facility is not eco-certified, but is conducted for years by environmental rules as a horticultural production system.

Methods: primarily non-destructive methods: Colorimetry in the CIE L * a * b *-color system (Minolta colorimeter CR-400), chlorophyll content (Minolta SPDA chlorophyll meter; Spada values, Minolta), digital photography of leaf canopies with image analysis (soil-cover, "coverage"). The leaf surfaces were measured with a leaf area meter (Li-Cor leaf area meter Li-3100, Delta T devices). In the frozen plant extract semi-quantitative methods (Merck Reflectoquant) were applied to nitrate, potassium and ascorbic acid. The Brix value (%) was measured with a digital Brix meters (Atago, Japan) and the pH, redox and conductivity value determined (Sen-tix 4.1, WTW). Fresh and dry weights were measured with an electronic precision balance (Sartorius, Germany). The drying was performed in an EHRET ventilated drying oven.

The seed was obtained from the company Austroaat AG (Austria), Erfurt seeds (Germany). The seed of Pak Choi was provided by the company Enza Zaden, representation in Austria. Plant strengthening agents: For this experiment are available: The plant tonic Myco-Sin and Alginure were purchased from the company Biohelp (Vienna), Planta Salva was provided by the company TVA (Hollenstein, Lower Austria).

System: There are three types of crops, in three repetitions and in four treatment variants; a total of 36 plots of 1.8 m, randomized, created. The plant tonic water, respectively, as compared variant were dosed according to data containers (Alginure and Planta Salva 0.5%, Myco-Sin 1%) and applied with a backpack sprayer (spray shield to avoid wind drift). The individual plots were separated from each other by narrow walkways. The syringe was cleaned between each variant. The border rows were not harvested.

RESULTS

Effects of plant strengthening agents were quantitatively collected on the above parameters. Applications were successful on Spinach and pak choi, but not on leaf color and P-value (redox, conductivity, pH "vitality") (Fig. 1).

Leaf number, fresh / dry weight ratio was influenced - but not consistently.

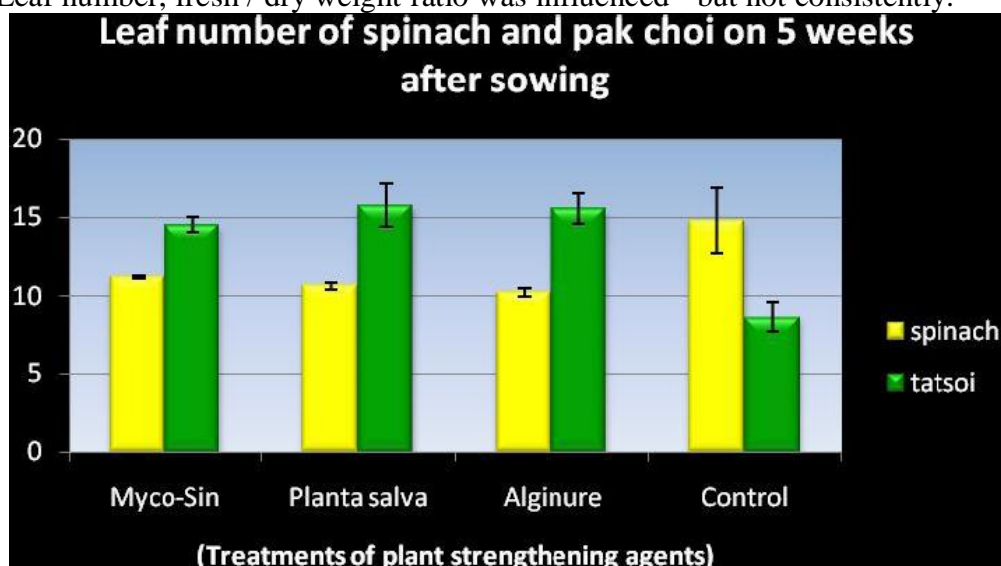


Fig. 1. Leaf number of spinach and pak choi 5 weeks after sowing

Within the leaf number Planta Salva as well as Alginure led to increased leaf numbers of tatsoi, but statistically not significant between the agents, but against the control. Spinach did not really react on each of the plant strengthening agents; the control group developed the

most leaves.

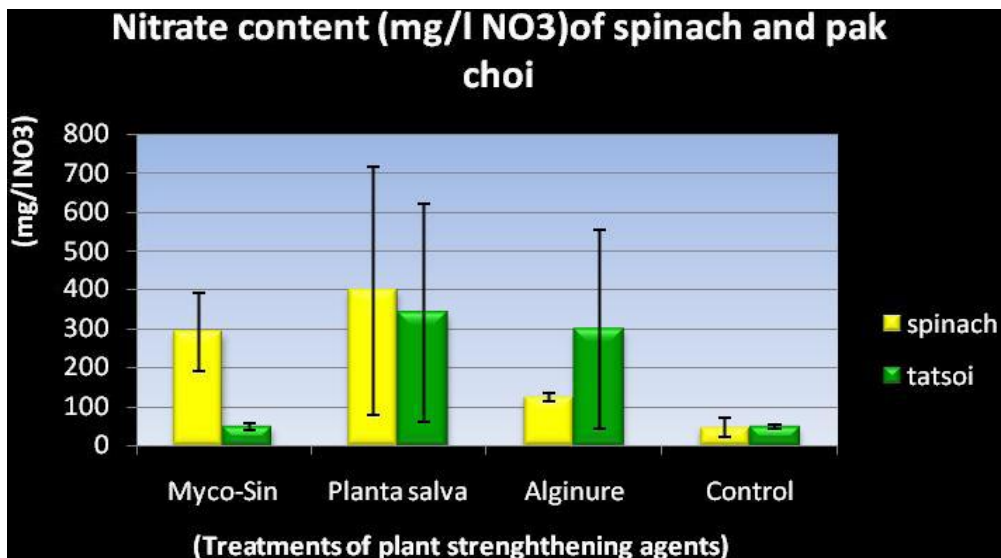


Fig. 2. Nitrate content (mg/l NO₃) of spinach and pak choi

The nitrate levels were several times higher in treatments than in the control, as well the sugar contents in the Planta Salva variant was much higher than in the other variants. (Zhou *et al.*, 2009). According to this paper, sugar is signaling uptake of nitrate. By this, the parameters are related and correlated.

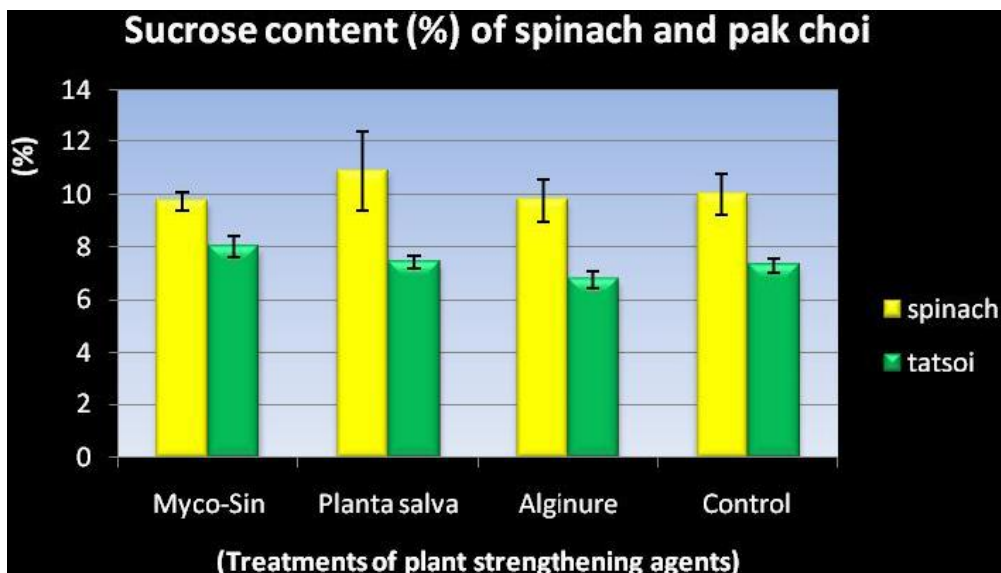


Fig. 3. Sugar content (Brix %) of spinach and pak choi

In another series of experiments, effects were investigated on the vase life of Zinnia, specially Planta Salva led to significant prolongation of vase life.

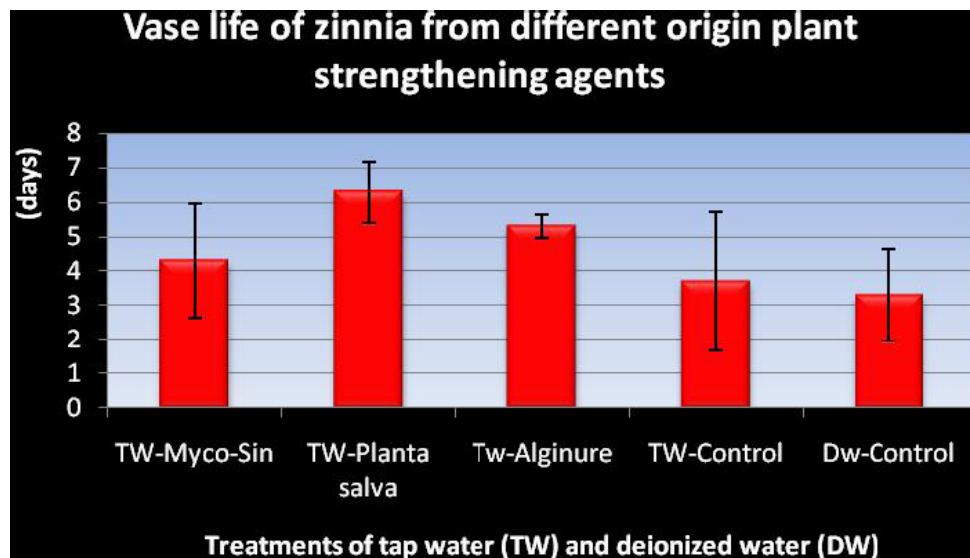


Fig. 4. Vase life of zinnia in days

It was to be assumed, the deionized water control group to be the shortest. Lasting longest is the variant Planta Salva, followed by Alginure, and Alginure shows the lowest variation. Highest variation was found within the tabwater-control and the tab-Mycosin-variant.

RESULTS AND DISCUSSION

The plant and product quality could be tested only partially. The unusually unsuitable weather conditions in spring and summer of 2010 led to significant impairments. Diseases and pests were encountered little and could not be rated in significant proportions. The "effectiveness" as a plant strengthening may be "assumed", but requires more targeted experimental verification (eg by inoculation with pathogens).

The observed effects (differences) were sometimes little or not significant, nor consistent across the crops. The given results especially in Planta Salva lead to assume a nutritional effect on the crops. This is to be proven in a new series of targeted experiments.

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