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A NEW BIOSTIMULANT TO ENHANCE THE FRUIT SIZE

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INTRODUCTION

Research activities in agriculture are focused on increasing yields while taking in consideration the sustainability of the cultivation systems.
Biostimulants are molecules that are often referred to positive plant growth regulators or metabolic enhancers. There are several categories of Biostimulant, such as products based mainly on: microbial inoculant, humic and fulvic acid, protein hydrolysates and amino acids, vitamins and seaweed extracts. All these components act on plant metabolism directly or indirectly. Over the last years, studies on biostimulants were conducted to investigate their action on plant physiology.
EXPANDO, a new biostimulant that contains different bioactive compounds such as amino acids, vitamins, cytokinin-like substances, potassium, phosphorus and molybdenum, has been developed to promote the fruit growth. Each component works sinergically to activate different metabolic processes.
Cytokinins are phytohormones that promote cells division and expansion. They interact with the other classes of plant hormones to stimulate and coordinate fruit development. The amino acids promote nitrogen assimilation in plants via coordinated regulation of carbon and nitrogen metabolism. Hydrolysated products based on vegetal origin amino acids contain mainly glutamic acid. Glutamate occupies a central position in amino acid metabolism in plant. Thanks to a reversible process known as transaminase reaction, different amino acids are originated from it. The amino acids generated from this process could be aspartate or member of the aspartate family (lysine, threonine, methionine and isoleucine), alanine, glycine, serine, proline and arginine.
The vitamins, a diverse group of organic molecules, are important antioxidant compounds and act as enzyme cofactors. EXPANDO contains B-group vitamins that take part in the Krebs cycle and enhance Nitrogen assimilation. The organic components have been enriched with mineral compounds (P, K and microelements).
Because of its accumulation in the vacuole during the cell extension, we could be consider potassium as one of the most important factors in the fruit growth stage.
EXPANDO has been investigated both in greenhouse and open field over a period of three years.
Furthermore genomic studies have been carried out on plant treated with EXPANDO, highlighting the up-regulation of genes involved in Nitrogen metabolism, in Sulfur uptake and in carbon and photosynthesis pathway.

Fig. 1: table grape, var. Italia, cultivated in Southern Italy, Apulia Region

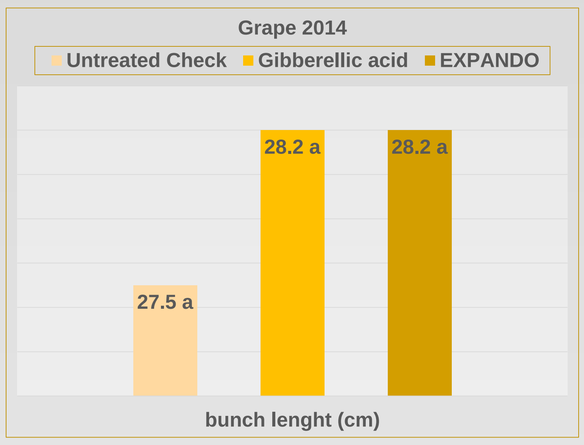
Fig. 2: pepper, cv Eppo, cultivated in Southern Italy, Campania Region

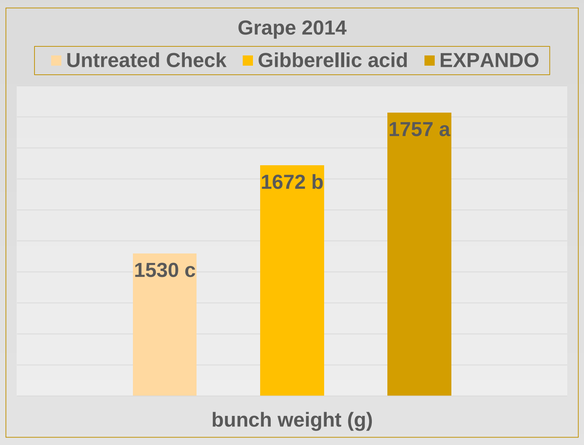
MATERIALS AND METHODS

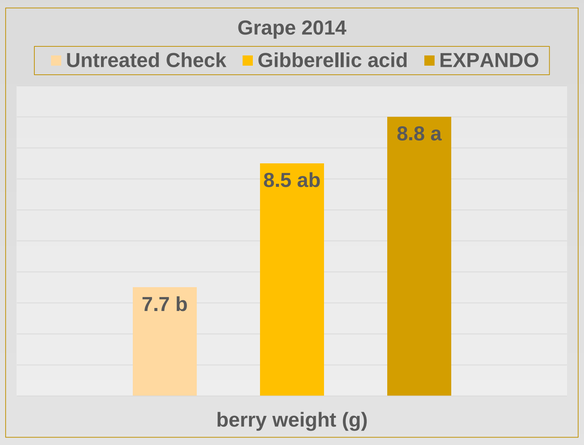
The trial on table grape (Italia variety) was carried out in 2014 in Apulia (Southern Italy), while the ones on vegetable crops, grown in protected conditions, were performed in 2013 (pepper, Palermo RZ variety) and 2014 (tomato, Rosambra F1 variety) in Almeria province (Southern Spain).
A randomized block design with four replicates was employed in each trial, with plot size of respectively 6 grapevine, 10 tomato and 40 pepper plants. Five or six applications of EXPANDO at 450 g/100 L were performed, with a water volume of 1000 l/ha, using a motorized backpack sprayer, at an interval of 10-15 days starting from the end of flowering/beginning of fruit setting stage.
At harvest the following parameters were evaluated in table grape trials on a random sample basis (200 berries from 25 bunches per plot): sugar content (°Brix), average diameter, weight and volume of the berries and average bunch length.
On pepper five assessments on the number of flowers and fruits in 20 plants per plot were performed during the trial period, while at the two main harvests the weight, diameter, length, sugar content and the pulp thickness of fruits were measured.
Similarly in the tomato trial, seven assessments took place to record the number of flowers and fruits in 5 plants per plot; the weight, diameter, length, sugar content and acidity were evaluated at two main harvests.
At the most representative picking all the ripe fruits from 10 plants per plot were classified as marketable and unmarketable, weighting and counting the fruit in each category.

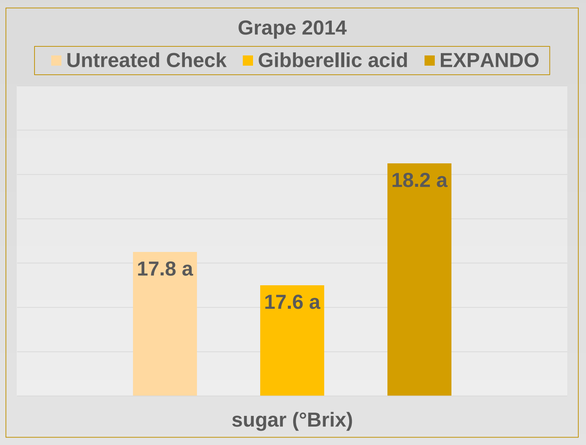
RESULTS ON TABLE GRAPE 2014

The test product EXPANDO on table grape, variety Italia, in 2014 showed a significantly better result than the untreated check in terms of bunch length and weight and berry weight, while it provided numerically higher values regarding berries sugar content. Furthermore EXPANDO obtained similar performances to the reference gibberellic acid-based product.





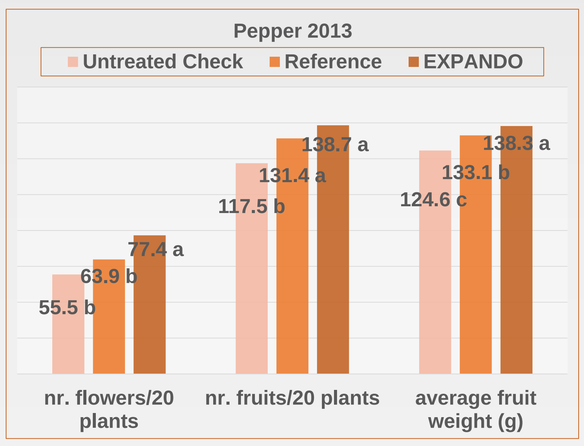


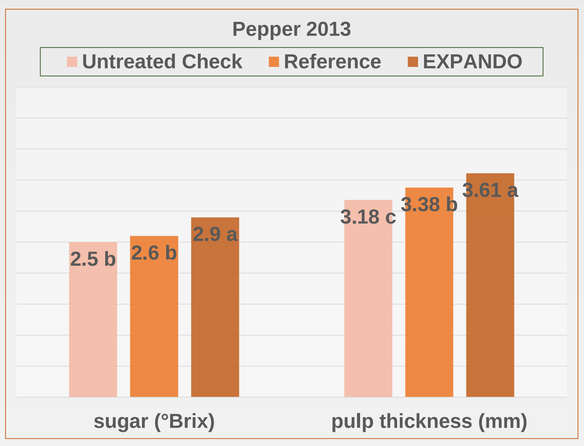


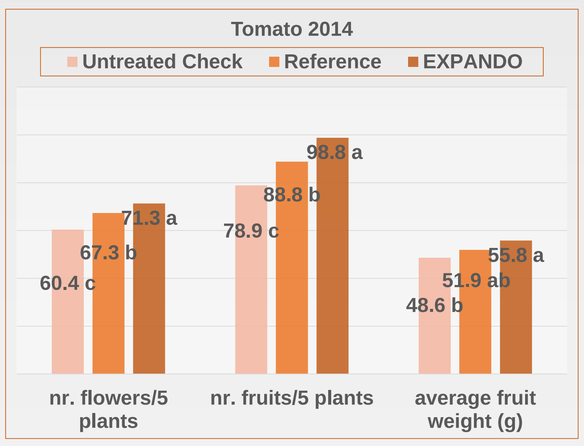
Means followed by same letters do not statistically differ according to p=.05 Tukey's HSD

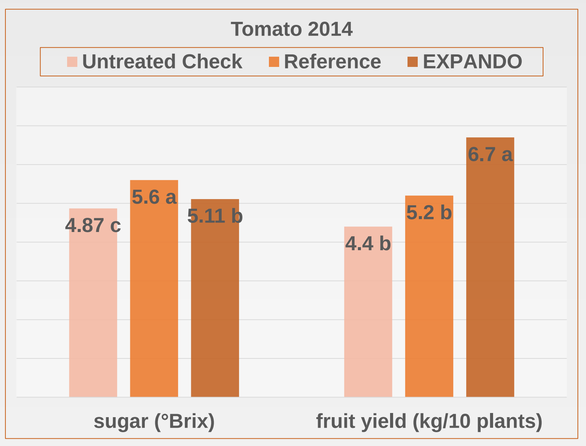
RESULTS ON PEPPER AND TOMATO 2013/2014

Consistent results were provided by EXPANDO in both vegetables trials: significantly higher sugar content, average fruit weight, number of induced flowers and set fruits than in the untreated check. Furthermore on pepper it was observed a significant increment of pulp thickness, while on tomato a remarkable increment in terms of weight and number of the yield of marketable fruits.









***Means followed by same letters do not statistically* differ according to p=.05 *Tukey's* HSD**