SZENT ISTVÁN EGYETEM

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EFFECTS OF HOT WATER EXTRACTS OF A COMPOSTED GREEN WASTE AND SEWAGE SLUDGE ON PLANT GERMINATION IN MODEL EXPERIMENT

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INTRODUCTIONS

- Application of aqueous extract (called as "compost tea") in horticulture is a well known topic but the agricultural use of these products is a much less investigated subject
- Compost tea application improves plant health, crop yield and quality
- Soluble mineral nutrients, organic acids and water-soluble plant-growth regulators extracted in the tea have positive effects on initial root development and plant growth
- Living microorganisms present in compost tea may also induce disease resistance as well as stimulate nutrient uptake and plant growth

This work was supported by the KTIA_AIK_12-1-2013-0015 program of the Hungarian National Development Agency.

INTRODUCTION

- Compost extracts or "teas" are not fertilizers but can increase the soil fertility.
- It is not a fungicide, insecticide or herbicide but can prevent, reduce or solve the plant protection problems (On et al., 2015).

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MATERIALS AND METHODS

- Test plants:
  - white mustard (*Sinapis alba*) (M),
  - spring barley (*Hordeum vulgare L.)* (A),
  - winter wheat (*Triticum aestivum L.*) (B)
  - triticale (*Triticosecale*) (T)
- 30 seeds were transferred to petri dishes containing 2 g cotton-wool and wetted with the compost extracts or distilled water
- randomized design was used, distilled water control (D), green waste compost extract (Z), and sewage sludge compost extract (S)
- treatments were replicated four times
- moisture content of petri dishes was monitored with daily weighing and was watered (distilled water or compost extracts) to weight

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MATERIALS AND METHODS

Compost extracts were made from the compost samples using 200 g dry weight equivalent compost in 1000 cm^3 distilled water. Samples were boiled for 30 min, rested for 2 h., and strained through a 0.45 µm sieve. Initial extracts were diluted with distilled water to 1:10.

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MATERIALS AND METHODS

- optical method was used to investigate the germination and growing rate of the test plants
- this method is based on pixel analysis
- pictures were taken from 8 different angles
- the image processing program counts the green pixels representing the color of leaves
- we could convert the plant growing status to numerical data

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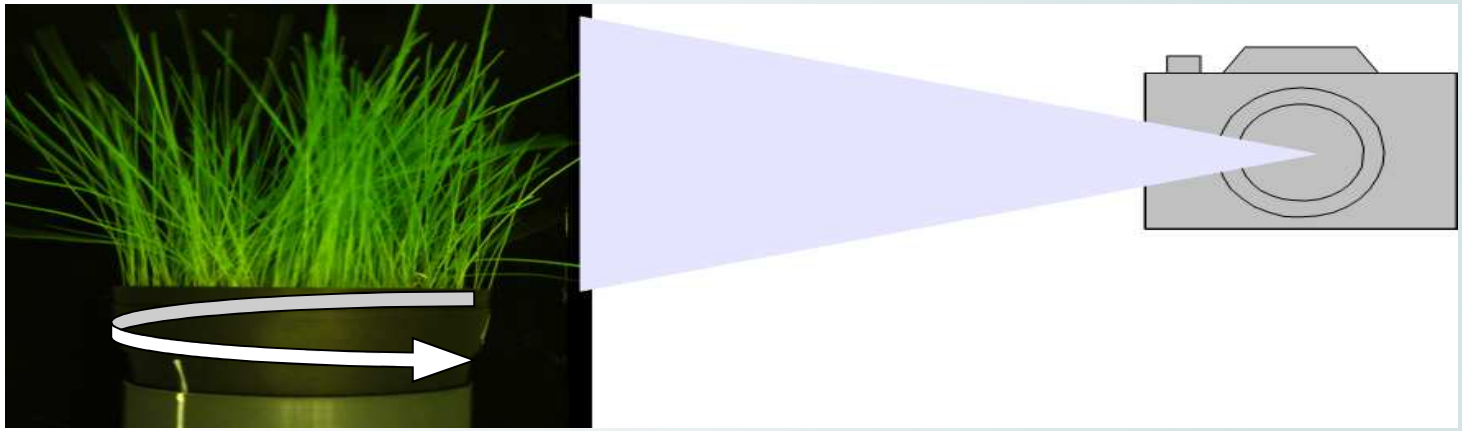
MATERIALS AND METHODS



- Differences were analyzed using by Microcal Origin 6.0
- y=A*(1-exp(-(t)*b))+c*t
- Where: ***y*** is the actual size (in pixels), ***t*** is the time (in days) a ***A*** is a maximal growing (in pixels), ***b*** is a growing constant (in 1 $days^{-1}$), ***c*** is a decreasing constant (in pixels $days^{-1}$)
- This equation is a composition of a classic Mitscherlich growing function, and a continuous linear decreasing caused by ageing and drying and other effects

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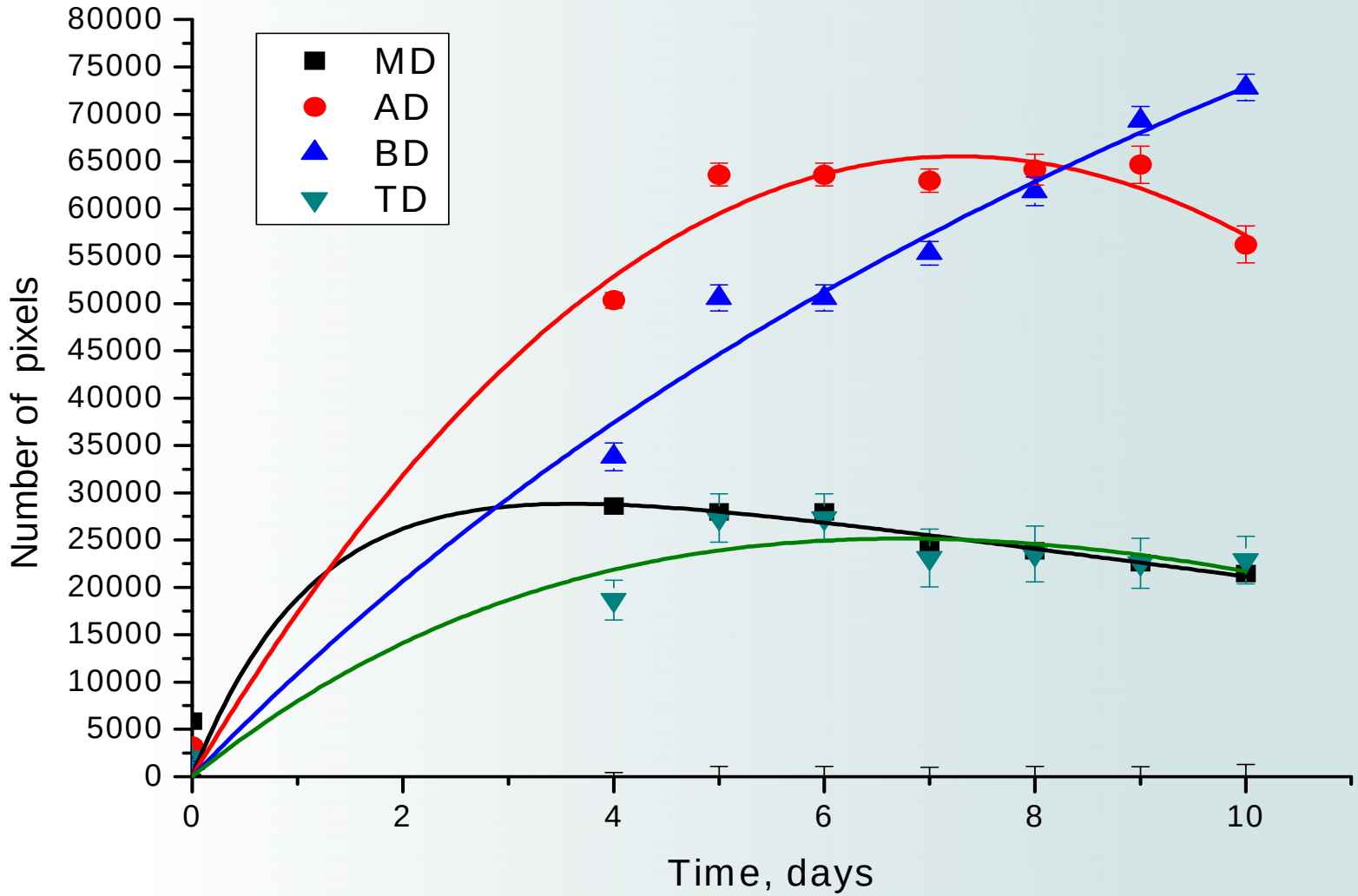
RESULTS



(white mustard (M), spring barley (A), winter wheat (B), triticale (T), distilled water control (D), green waste compost extract (Z), sewage sludge compost extract (S))

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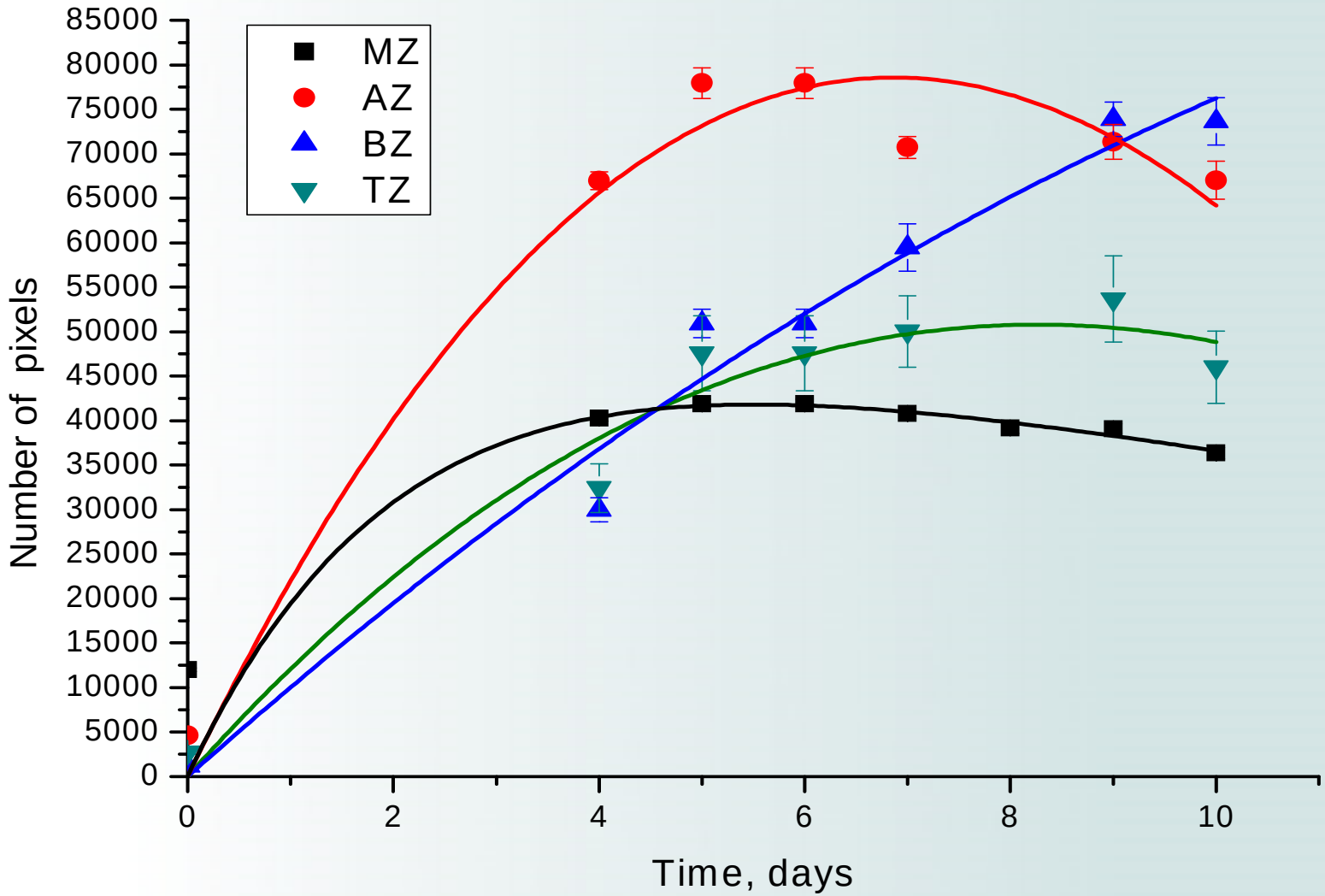
RESULTS



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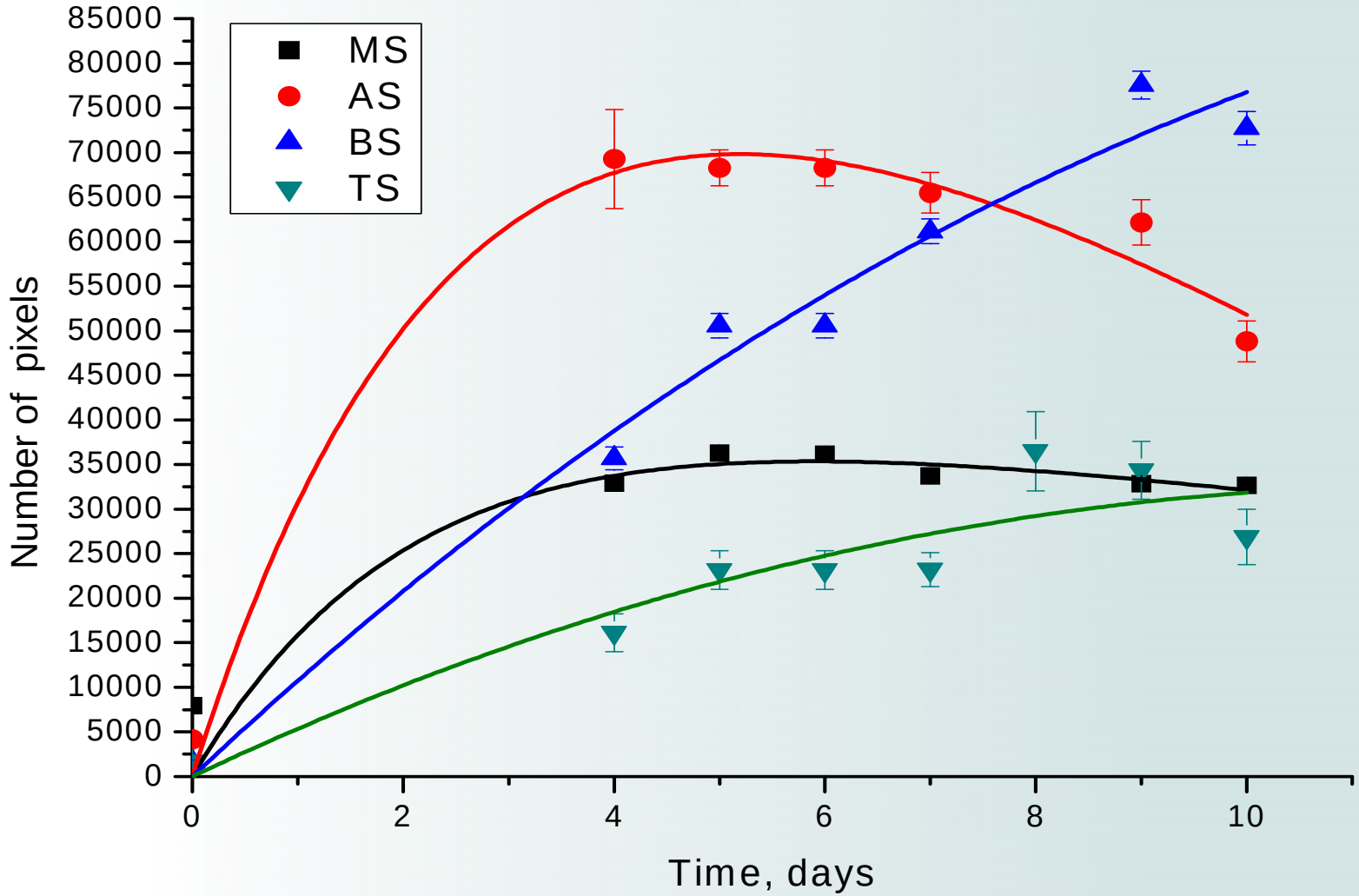
RESULTS



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Conclusions

- This method good for short plant tests
- Compost extracts have effect, despite boiling
- Green waste comp. extract outstanding effect
- Sewage sludge comp. extract increased the number of pixels
- Winter wheat did not show any responses
- These results create good basis to the further experiments in the near future

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Thank you for your attention!