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THE INFLUENCE OF FERMENTABLE WASTE COMPOST ON VEGETATION AND FLOWERING IN MARIGOLDS

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Abstract: The study evaluated the influence of the compost resulting from fermentable materials on the vegetation and the flower size of *Tagetes erecta* F1 Discovery Orange plants. The experiment was organized in Salonta, under controlled conditions, on pots with growth substrate. The experiment was organized in four repetitions. The compost was used in different volumetric concentrations, together with peat and vermiculite (V2 – 100:0:0; V3 – 20:70:10; V4 – 30:60:10; V5 – 40:50:10). For the control version (V1) substrate from garden soil was used. The species *Tagetes erecta* F1 Discovery Orange was used as biological material. The vegetation period from sowing to the beginning of flowering (VpEF) was evaluated within each variant. To determine the size of the first flowers (FfD), the diameter of the open flowers on each variant and repetitive was measured. VpEF and FfD variation were analyzed in relation to the compost concentration (Cc) in the substrate, for each variant. The vegetative parameter, VpEF, varied between 93.75±3.50 days for variant V5 and 105.50±4.57 days for variant V3. The FfD floral quality index varied between 6.65±0.31 cm for the V1 variant and 8.50±0.65 cm for the V4 variant. According to the Anova test, the experimental data showed statistical certainty ($F > F_{crit}$; $p < 0.001$). The variation of VpEF (days) in relation to Cc (volumetric concentration) was described by a spline model, under statistical safety conditions ($\bar{\epsilon} = 0.00014$). The variation of FfD in relation to the compost concentration (Cc) was described by the spline model under conditions of $\bar{\epsilon} = 0.00043$. The variation of FfD in relation to VpEF was described by the spline model in terms of $\bar{\epsilon} = 0.00055$. According to PCA, the differentiated distribution of the variants was found in relation to the parameters considered (Cc, VpEF, and FfD) as biplot. Variant V2 was positioned associated with Cc (the concentration of compost in the substrate, 100% in the case of V2). The V4 variant was positioned associated with FfD, and the V3 variant was positioned associated with VpEF. PC1 explained 63.541% of variance, and PC2 explained 21.409% of variance.

• Introduction

The cultivation of horticultural plants in "soilless" systems has been increasingly promoted, as a result of some facilities that horticulture brings into practice [22]. Different artificial media and substrates for plant growth have been described and characterized, in relation to their obtaining, properties and conditions of use for various systems and conditions of plant cultivation [18]. Numerous studies with favorable results on biometric parameters were made on flowers using different growing mediums in making substrate mixtures e.g. vermicompost, manures, fermentable agro-industrial waste, rice husk, coconut fiber, sand, peat, soil, tree bark, sewage sludge, vermiculite, perlite, etc., applying different cultivation technologies.

• Material and method

The study evaluated the influence of some growing substrates, including different concentrations of compost from fermentable waste, on the vegetation period and some indices of floral quality (flower size) in *Tagetes*, and finding some models to describe the response of plants to the conditions of surveyors. The biological material was represented by *Tagetes erecta* F1 Discovery Orange, figure 1. The experiment was organized on pots, in four repetitions for each variant of growing substrate. During the experiment were determined indices such as the beginning of flowering (VpEF), the diameter of the first flower (FfD) in relation to the presence of compost in the substrates. The different analysis and mathematical and statistical processing of the data was done, in order to evaluate the interdependence relationships between the evaluated parameters, the association of the parameters in relation to the experimental variants and the variation of the parameters in relation to the compost concentration in the growth substrates.



Figure 1. Example of a *Tagetes erecta* F1 Discovery Orange flower from the experiment

• References

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• Results and discussions

Based on the determinations made, the VpEF recorded values between 93.75±3.50 days for V5 variant and 105.50±4.57 days for V3 variant (Fig. 2). The FfD average values were recorded between 6.65±0.31 cm for V1 and 8.50±0.65 cm for V4 (Fig. 3). The Anova test confirmed the presence of variance and the statistical reliability of the recorded experimental data series (Alpha=0.001, $F > F_{calc}$, $p < 0.001$). The V4 variant was positioned associated with FfD, and the V3 variant was positioned associated with VpEF. The V5 variant is positioned intermediate between FfD and Cc, closer to Cc. Independent positioning was found in the case of the V1 variant. PC1 explained 63.541% of variance, and PC2 explained 21.409% of variance.

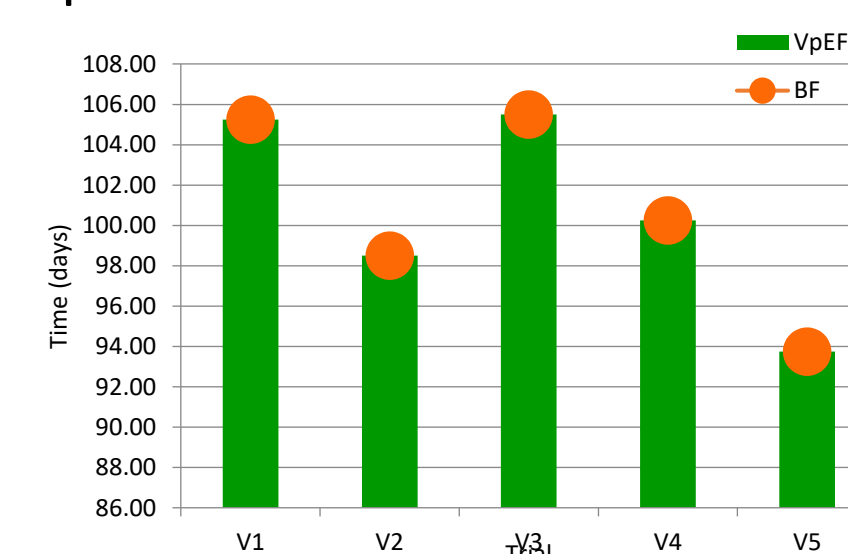


Figure 2. The vegetation period of *Tagetes erecta* F1, from emergence to flowering (VpEF)

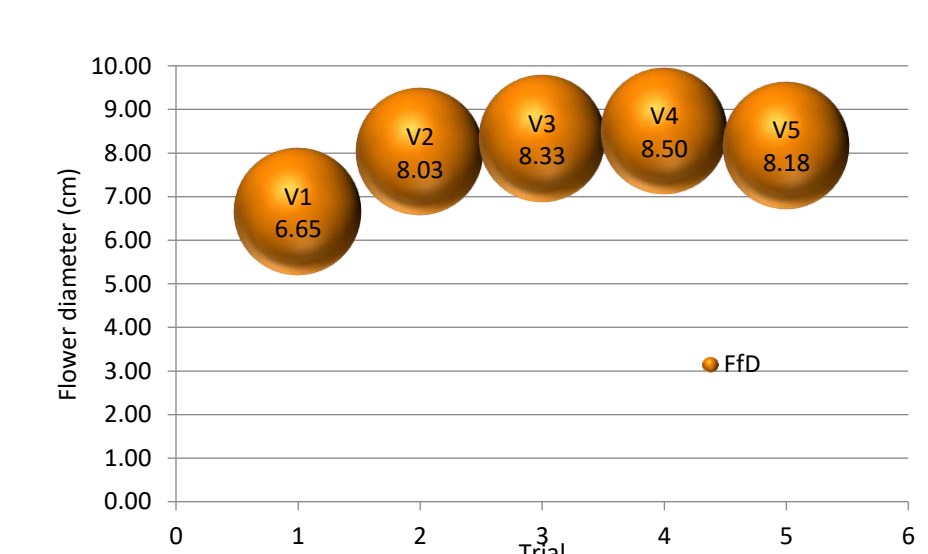


Figure 3. Graphic representation of flower diameter (FfD) on experimental variants

The variation of VpEF and the variation of FfD in relation to the concentration of compost in the growth substrates (Cc, %), was faithfully described by spline models, with a graphic representation in figures 4.a), b) and the calculation of errors according to the equation:

$$\bar{\epsilon} = \left(\sum_{i=1}^n \epsilon_i \right) / n = \left(\sum_{i=1}^n \left| \frac{y_{Si} - y_i}{y_i} \right| \right) / n$$

Also, the FfD in relation to VpEF was faithfully described by a spline model, with a graphic representation in figure 4.c).

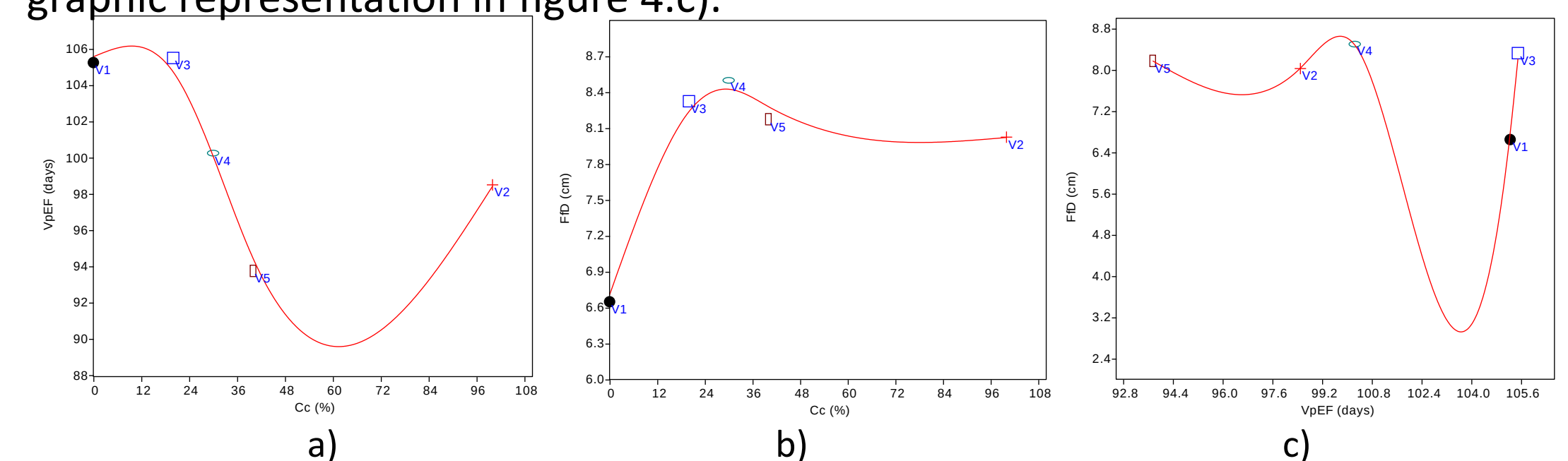


Figure 4. Graphic distribution of the spline model in the description of a) - VpEF variation in relation to Cc; b) - FfD variation in relation to Cc; c) - FfD in relation to VpEF, *Tagetes erecta* F1

• Conclusions

The variable concentration of compost (Cc) differentially influenced the variation of the vegetation period of the tagetes plants from emergence to flowering (VpEF) and the size of the flowers at the first inflorescences (FfD). The spline type model described the variation of the vegetative parameters (VpEF) and floral quality (FfD) in relation to the compost concentration (Cc, in volumes). The multicriteria analysis (PCA) facilitated the generation of a diagram in which the distribution of the variants in relation to the considered parameters (Cc, VpEF, FfD) was highlighted, under the conditions that PC1 explained 63.541% of variance, and PC2 explained 21.409% of variance. In the tested concentrations of compost to obtain the growing substrates, and based on the recorded results, it can be appreciated that it represents a resource with the potential to be used to create substrates for horticultural crops in pots, but also for open spaces.