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EVALUATION OF THE DIRECT AND SUBSEQUENT INFLUENCE OF A SUPERSORBENT POLYMER ON CROPPING AND RATE OF GAS EXCHANGE OF STRAWBERRY (*Fragaria ananassa* Duch.) 'ELSANTA'

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A B S T R A C T

In the years 2007-2008, a pot experiment was carried out on the effect of a supersorbent polymer on cropping and rate of gas exchange of 'Elsanta' strawberry. The experiment took place in the Vegetation Hall of the West Pomeranian Technological University in Szczecin and was done in a completely randomized design. The experimental factors were two doses (8 and 3.6 $g \cdot dm^{-3}$) of gel polymer AgroHydroGel, added to the medium prior to planting. Its direct (in 2007) and subsequent (in 2008) effect on the amount and quality of crops and the physiological activity of strawberry was assessed. It was found out that a larger applied dose of supersorbent caused a decrease in the strawberry yield. The differentiated doses of AgroHydroGel did not have any significant influence on the weight of an individual fruit (7.89-9.3 g) and on longitudinal (27.5-30.0 mm) and crosswise diameter (27.5-29.3 mm). Recordings were made of the increase in the dose of AgroHydroGel, the increase in the content of the extract and L-ascorbic acid, and the decrease in accumulation of nitrates and nitrites, in strawberry fruit. A direct influence of the applied polymer on the increase in CO_2 assimilation in strawberry leaves at the fruiting stage was observed. In the first year of the studies, the intensity of transpiration in the phases of fruiting and after fruiting was increased along with the increase in the doses of AgroHydroGel, whereas in the subsequent year such a relationship was observed in the phase of flowering. The largest index of effectiveness of water use, in the photosynthesis in the subsequent year in all the growth phases, was characteristic of the control plants.

Key words: *Fragaria ananassa* Duch., AgroHydroGel, yield, gas exchange

INTRODUCTION

One of the main factors limiting strawberry crops is water deficit occuring mainly in the period of ripening and gathering of fruit and bud formation (Treder, 2003; Klamkowski et al., 2006). Traditional drip watering can be completed by cultivation of strawberries in the medium with the addition of multiparticle synthetic polymers. These polymers are capable of bonding particles and soil microaggregates into stable macroaggregates (Wallace and Wallace, 2003; Ben-Hur, 2006). Due to the improvement of the stability of aggregates, it is possible to shape various properties responsible for fertility and productivity of soils. It is possible to shape soil compaction, aquatic and air, physico-chemical, chemical and biological properties. Hydrophilic gels, among others, belong to the synthetic polymers. The applied AgroHydroGel is a cross-linked polyacryloamide gel polymer. The dried coils have the appearance of crystalline white grains 0.1-4 mm in diameter, and their capability for absorbing water equals 300-500 $cm^3 \cdot g^{-1}$ (Agroidea 2004). During the wetting, the amide groups of these compounds undergo solvation and dissociation, univalent cations detach, and negative charges of the polymer chain repel each other under the influence of electrostatic forces. This process leads to the loosening of polymer wound coils. The loosening allows for the possibility of further absorption of water and formation of gel (Hua and Qian, 2001; Sivapalan, 2006; Taban and Movahedi Naeini, 2006; Paluszek and Żembrowski, 2008). By binding gravitational water, the hydrogels reduce evaporation and limit moisture fluctuation of the medium (Gehring and Lewis, 1980; Kowalczyk-Juśko and Kościk, 1999). A positive feature of sorbents is also maintenance of optimum aquatic and air conditions of the medium, even in the case of high medium density (Martyn, 1991).

It is very important to appropriately adjust the dose of hydrogel. Too large an amount can result in disturbing the aquatic and air relations in the medium and growth inhibition of plants. This action happens due to accumulation of toxic substances and disturbances of the respiratory process (Starck et al., 1995).

The aim of the studies was to determine a direct and subsequent effect of the application of differentiated doses of the gel polymer AgroHydroGel (Agroidea, Gdańsk) to the medium, on the amount and quality of the crop and the physiological activity of the strawberry cv. 'Elsanta'.

MATERIAL AND METHODS

In 2007-2008, a pot experiment in a completely randomized system of was carried out in four replications in the vegetation hall of the West Pomeranian University of Technology in Szczecin. The object of the study was the strawberry cv. 'Elsanta'. The experimental factor was the addition of AgroHydroGel

Table 1. The properties of soil

pH		Clay fraction [%]	S_o [g·cm^{-3}]	Pkw [%]	Pkv [%]	Wtw [%]	Wtv [%]
H_2O	KCl						
6.58	5.97	21	1.24	24.7	34.0	32.9	38.0

S_o – bulk density, Pkw – capillary weight, Pkv – capillary volume,
Wtw – total water capacity – weight, Wtv – total water capacity – volume

to the medium. Two doses of the gel were applied at 1.8 and 3.6 g·dm^{-3}, i.e. 15 and 30 g per Kick's container. The control was the medium with no gel. Pots of 10 dm^3 capacity were filled with 8 dm^3 of soil material. Prior to filling the pots, hydrogel was added to the medium and mixed. Table 1 shows the characteristics of the soil material. A direct effect of AgroHydroGel on strawberry was studied in 2007, whereas the subsequent effect was examined in 2008.

For all plants, the same mineral fertilization was used. The doses of fertilization were (kg·ha^{-1}): 50 N, 80 P and 100 K. Potassium, phosphorus and half a dose of nitrogen fertilization was applied prior to planting. Half a dose of nitrogen was top-dressed before the flowering of the plants.

In mid April 2007, "frigo" plants were placed in containers, 1 piece per a pot. The plants wintered in pots in an unheated glasshouse. Soil moisture was measured by means of soil contact tensiometers. All plants were watered when the tensiometer (fitted in the medium with 15 g of added gel per pot) showed 450 hPa. Then plants were watered with 0.5 dm^3 H_2O/pot. Well grown, healthy leaves, and ripe fruit were taken for determination.

The yield of fruit, individual mass, crosswise and longitudinal diameter were determined for ripe fruit from 4 plants of each experiment.

The content of L-ascorbic acid, nitrate and nitrite was determined in juice by a reflectometer RQflex 10 (Merck). For juice extraction efficiency, fruit were homogenized with a blender (with the addition of pectinase). Then the juice was filtered and diluted with distilled water in a ratio of 1:10. Total acidity in fruit was determined by titration of a water extract of strawberry homogenate with 0.1 N NaOH to the end point of pH 8.1 (according to PN-90/A-75101/04). Soluble solids content was determined by a refractometer Atago Pol 1. Thirty fruit from each variant of the experiment, harvested in the peak period of plant flowering, were selected for the determination.

The measurements of gas exchange in leaves of *Fragaria ananassa* Duch. 'Elsanta', i.e. the net intensity of the photosynthesis process (A), transpiration (E), stomatal conductance for water (g_s), and the concentration of carbon dioxide in the intercellular spaces (c_i), were made in 8 replications in three growth phases of strawberry: the end of flowering - the beginning of fruiting, peak of fruiting, after fruiting. The measurements were carried out with the use of a TPS-2 gas analyzer with a PLC-4 chamber, manufactured by PP Systems (UK). The results of the measurements carried out on healthy, fully grown leaves of strawberries, were read in the 8th minute after the leaf was put into the measurement chamber. On the basis of the obtained results of the intensity of assimilation and transpiration, the index of effectiveness of water use in the process of photosynthesis (ω_F), estimated by the ratio A:E, was calculated.

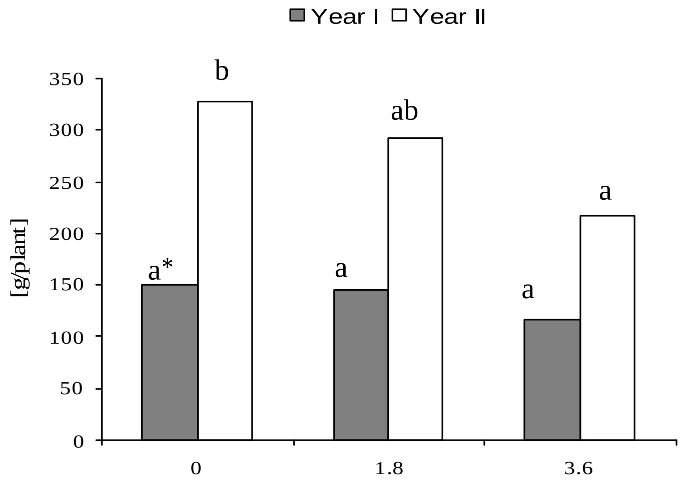
The results of the research for each year were put to a one-factor analysis of variance. The significance of differences between the averages were defined by Duncan's test at $p = 0.05$.

RESULTS AND DISCUSSION

Studies carried out in Poland and all over the world show a positive effect of hydrogels applied to soils and garden media on the growth, flowering and fruiting of many plant species (Michalak and Hetman, 1997; Jabłońska-Ceglarek and Cholewiński, 1998; Makowska and Borowski, 1998; Volkmar and Chang, 1995; Rugoo and Govinden, 1999; Sivapalan, 2001). However, there are studies which show that the application of hydrogels has no influence or even a negative influence on the growth and the yield of plants (Austin and Bondari, 1992; Awad et al., 1995).

In both years of our studies, no significant effect was observed of AgroHydroGel applied in a dose of 1.8 g·dm^{-3} on the yield of strawberry fruit. Whereas, plants cultivated in the medium to which 3.6 g·dm^{-3} was added, showed a decrease in the yield of fruit in the first and in the second year of the studies in relation to the control plant, by 22.4 and 33.5%, respectively (Fig. 1). There were smaller yields of plants, using a larger dose of AgroHydroGel than the control plants. Such small yields result from the fact that when too large a dose is applied, the contribution of water inaccessible to the plants in the soil increases, and the contribution of the accessible water decreases. The larger the dose of supersorbents applied to the soil, the smaller the possibility of full hydration by the soil. Thus, hydrogels can compete for water with cultivated plants. Similar results have been presented by Słowińska-Jurkiewicz and Jaroszuk (2001). The effect of a 6 g of hydrogel per 1 dm^{-3} of soil dose proved unfavourable to the yields of strawberry in field cultivation, according to Makowska (2004).

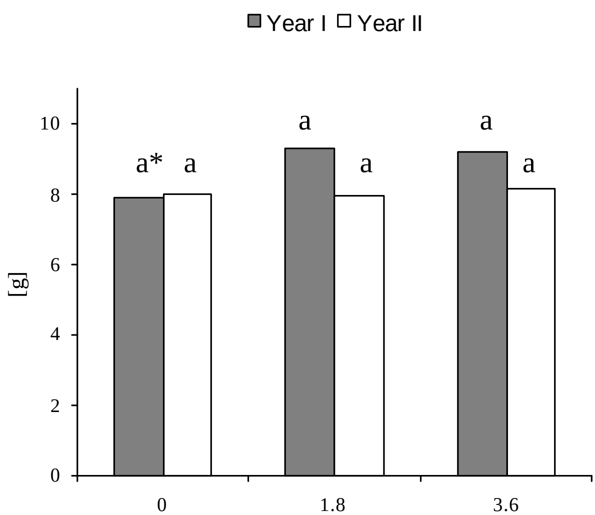
The application of differentiated doses of supersorbent to the medium did not have any significant influence on the weight of the individual fruit (Fig. 2). According to Makowska and Borowski (2004) and Makowska et al. (2005) the largest fruit yield with the largest unit weight, of some of the studied



Dose of AgroHydroGel [g·dm^{-3}]

*Averages followed by the same letter do not differ significantly at p = 0.05 (Duncan's multiple range test)

Figure 1. Yield of strawberry 'Elsanta'



Dose of AgroHydroGel [g·dm^{-3}]

*Explanation: see Figure 1

Figure 2. Weight of the individual fruit of strawberry 'Elsanta'

strawberry varieties was obtained on two types of soil to which 3 g of hydrogel Ekosorb per dm^{-3} was added. Whereas, a further increase in the dose of this supersorbent did not affect the mentioned features of strawberry.

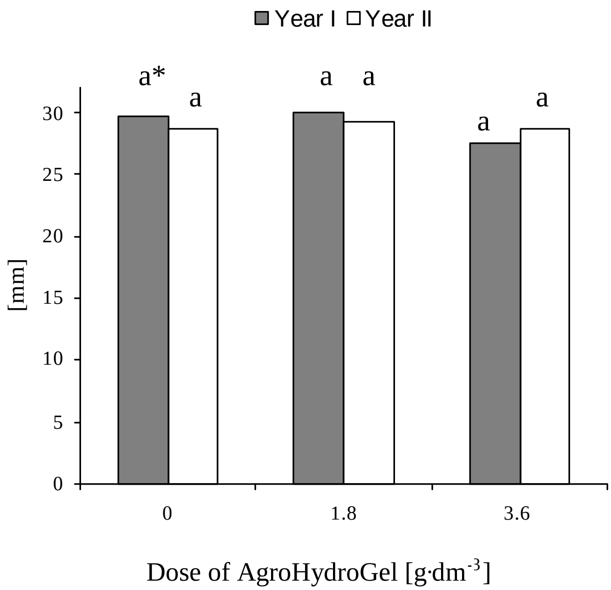
AgroHydroGel did not significantly affect the longitudinal (27.5-30.0 mm) and crosswise (27.5-29.3 mm) diameter of strawberry fruit (Fig. 3, 4).

In the first year of the studies no influence of the applied polymer on the content of the dry matter in strawberry fruit was observed. In the subsequent year, although no statistically significant differences were shown, the fruit of plants growing in the medium to which 3.6 g of hydrogel·dm^{-3} was added, contained 19.9% more dry matter than the fruit of control plants (Tab. 2). According to Wierzbicka and Majkowska-Gadomska (2005), the polymer called sodium Akrygel did not significantly affect accumulation of dry matter in two varieties of lettuce.

In both years of our studies, there was a significant increase in the content of the extract in the fruit when an increase in the dose of AgroHydroGel was used (Tab. 2). The fruit which used 1.8 g of hydrogel·dm^{-3} were characterized by a larger content of the extract than the fruit of control plants, in the first and the second year of the studies, by 10 and 6.2%, respectively. The applied higher dose of supersorbent resulted in a particularly large increase in the content of the extract in fruit, in the subsequent year (33.4% as compared to the control plants).

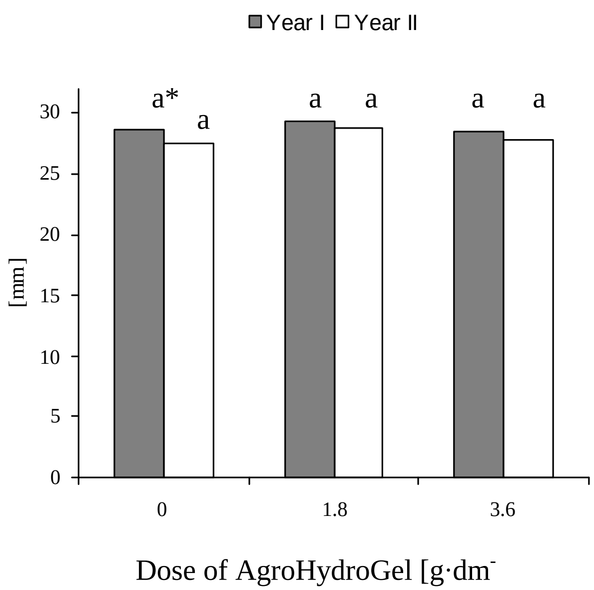
The addition of the gel polymer caused an increase in the content of L-ascorbic acid in fruit of the studied variety of strawberry. The largest amount of L-ascorbic acid was observed in fruit of the plants growing in the medium with the addition of a smaller dose of hydrogel (67.68 mg·100 g^{-1}) in the subsequent year, and in both years of the studies in fruit of the plants using a larger dose of hydrogel (60.0 and 69.0 mg·100 g^{-1}) (Tab. 2). Makowska (2004) and Jabłońska-Ceglarek and Cholewiński (1998) think that the addition of hydrogel to the medium has a favourable influence on plant yield due to the increase in the content of the extract in strawberry fruit and vitamin C in pepper (paprika) fruit. According to Koszański et al. (2006) optimum soil moisture increased the vitamin C content in strawberry fruit.

It should be noted, that observed amounts of nitrates (40.0-66.7 mg·kg^{-1}) and nitrites (0.17-0.35 mg·kg^{-1}) in the fruit was low. According to Markiewicz et al. (1998) an average content of these compounds in strawberry fruit varies within 28.36-65.12 mg $NaNO_3$ per kg to 0-0.44 mg $NaNO_2$ per kg. With the use of AgroHydroGel there was a decrease in the accumulation of nitrates and nitrites in fruit of the studied variety. In the first year of the studies, the fruit of the plants using the gel polymer at a dose of 3.6 g·dm^{-3} accumulated 23% less nitrates than the fruit of control plants. In the subsequent year, the addition of the supersorbent in doses of 1.8 and 3.6 g·dm^{-3} caused a decrease in the accumulation



*Explanation: see Figure 1

Figure 3. Longitudinal diameter of the fruit of strawberry 'Elsanta'



*Explanation: see Figure 1

Figure 4. Crosswise diameter of the fruit of strawberry 'Elsanta'

Table 2. The content of dry weight, extract, ascorbic acid, nitrates and nitrites in the fruit of strawberry 'Elsanta'

Year	Dose of Agro-HydroGel [g·dm^{-3}]	D.W. [%]	Extract [%]	L-ascorbic acid [mg·100g^{-1}]	$N\text{-}NO_3$ [mg·kg^{-1}]	$N\text{-}NO_2$ [mg·kg^{-1}]
I	0	8.01 a* (100)**	7.06 a (100)	48.67 a (100)	59.0 b (100)	0.35 b (100)
	1.8	7.84 a (97.9)	7.77 b (110.0)	52.33 a (107.5)	51.7 ab (87.6)	0.32 b (91.4)
	3.6	8.97 a (112.0)	7.90 b (111.9)	60.00 b (123.3)	45.3 a (76.8)	0.25 a (71.4)
Mean		8.27	7.58	53.7	52.0	0.31
II	0	8.43 a (100)	6.47 a (100)	59.68 a (100)	66.7 b (100)	0.25 b (100)
	1.8	8.26 a (98.0)	6.87 b (106.2)	67.68 b (113.4)	43.3 a (64.9)	0.22 ab (88.0)
	3.6	10.11 a (119.9)	8.63 c (133.4)	69.00 b (115.6)	40.0 a (60.0)	0.17 a (68.0)
Mean		8.93	7.32	65.45	50.0	0.21

*Averages followed by the same letter do not differ significantly at $p = 0.05$ (Duncan's range test)
**% of control

of nitrates in fruit by 35 and 40%, respectively, as compared to the control. The content of nitrites in fruit of the studied variety decreased significantly in the plants grown in the medium to which 3.6 g·dm^{-3} was added, as compared to the content in fruit of the control plants, and to those using the dose of 1.8 g·dm^{-3} (1st year of the studies) and to the control variant (2nd year of the studies) (Tab. 2). According to Koszański et al. (2006) and Rumasz-Rudnicka et al. (2009) improving soil moisture conditions increases the activity of nitrate reductase and reduces the nitrate content in the plant.

The activities of photosynthesis and transpiration are strictly connected with productivity of plants. These processes interact, however, their mutual relations can have a wide range of change, depending on environmental conditions (Jones, 1998). Maintaining a high photosynthetic activity of leaves is a very important factor of plant crops. This high activity is particularly important when there is an influence of different kinds of stresses (Lichtenthaler and Rindere, 1998).

In the first year of the studies, in the phase of fruiting, a significantly larger intensity of CO_2 assimilation was observed in the leaves of strawberry grown in medium to which a gel polymer was added than in the leaves of the control plants. After AgroHydroGel in doses of 1.8 and 3.6 g·dm^{-3} had been applied, the photosynthesis increased by 95.8 and 118.5%, respectively, as compared to the control. Whereas, in the remaining growth phases of the first year of

Table 3. The intensity of assimilation of CO_2 and transpiration in the leaves of strawberry 'Elsanta'

Year	Dose of Agro-HydroGel [g·dm^{-3}]	The development stage of plants		
		flowering	fruiting	after fruiting
Assimilation CO_2 (A) [μmol·m^{-2}·s^{-1}] (% of control)				
I	0	10.30 a* (100)	4.33 a (100)	9.17 a (100)
	1.8	7.40 a (71.8)	8.46 b (195.8)	7.00 a (76.4)
	3.6	10.30 a (100)	9.44 b (218.5)	9.63 a (105.0)
Mean		9.33	7.41	8.60
II	0	13.03 b (100)	10.00 b (100)	12.77 b (100)
	1.8	9.67 a (74,0)	7.65 a (76.5)	9.60 a (75.2)
	3.6	9.33 a (72.0)	7.92 a (79.2)	10.12 a (79.2)
Mean		10.68	8.52	11.33
Transpiration (E) [mmol·m^{-2}·s^{-1}] (% of control)				
I	0	1.35 a (100)	0.79 a (100)	0.69 a (100)
	1.8	1.40 a (103,9)	0.96 a (121.2)	0.72 a (102.9)
	3.6	1.32 a (98.0)	1.50 b (188.1)	0.92 a (133.3)
Mean		1.35	1.08	0.78
II	0	0.66 a (100)	0.43 a (100)	1.05 a (100)
	1.8	1.04 b (156.9)	0.43 a (100)	0.92 a (86.7)
	3.6	1.28 b (191.5)	0.57 a (131.9)	1.14 a (108.6)
Mean		0.99	0.48	1.04

*Explanation: see Table 2

the study, no significant effect of the applied supersorbent on the intensity of the photosynthesis was shown. In the subsequent year, in all the growth phases of strawberry, the significantly largest photosynthetic activity was recorded in plants growing in the control conditions (Tab. 3).

In the first year of our studies, there was a tendency for the intensity of transpiration of strawberry in the phases of fruiting and after fruiting to increase, along with the increase in the dose of gel polymer. However, not all the differences between the means were statistically significant.

In the next year, a tendency for the intensity of transpiration of strawberry in the phase of flowering to increase, with the increase of the gel dose, was observed. A particularly large intensity of transpiration was observed in the first year. This intensity took place in the phase of fruiting and after fruiting, in strawberry growing in the medium with the addition of hydrogel in the dose of 3.6 g·dm^{-3}. It was larger than the transpiration of the control plants by 88.1% and 33.3%, respectively. Whereas, in the second year of the studies, in the phase of flowering when the same dose of gel polymer was used, the intensity of plant transpiration was higher by 91.5%, as compared to the plants growing without the addition of the supersorbant. The largest influence of AgroHydroGel on this physiological feature, was a direct influence (Tab. 3). Klamkowski et al. (2006) and Koszański et al. (2005) studied the effect of soil moisture on gas exchange activity of strawberries. They found that limited soil moisture was the cause of reduction in the rate of photosynthesis and transpiration. Similar results in experiments with plants of other species (highbush blueberry, spring cereals and legumes) was obtained by Koszański and Rumasz-Rudnicka (2008), Karczmarczyk et al. (1999) and Podsiadło et al. (1999).

The intensity of the processes of photosynthesis and transpiration depends on the stomatal conductance (g_s), the characteristic feature of which is simultaneously the rate of diffusion of water vapour from the leaf and the linear rate of the forced flow of air through the leaf (Ludlow, 1982). In the phases of fruiting and after fruiting in both years of the studies, and in the phase of flowering in the subsequent year, the largest stomatal conductance for water was characteristic of leaves of the strawberry growing in the medium to which 3.6 g of AgroHydroGel·dm^{-3} was added. However, the differences between the averages were not statistically significant (Tab. 4).

The measurement made after the fruiting of strawberry showed that the concentration of CO_2 in intercellular spaces of leaves (c_i) increased along with the increase in the applied doses of supersorbant. In the remaining growth phases of plants, the effect of AgroHydroGel on this parameter of gas exchange was equivocal (Tab. 4).

The influence of the applied gel polymer on the activity of gas exchange of the studied strawberry variety was variable and to a large extent it depended on the growth phase of plants. In the studies by Makowska et al. (2005), the largest photosynthesis, transpiration, and stomatal conductance were shown by the leaves of strawberry grown on soils to which 3 g·dm^{-3} of gel polymer Ekosorb was added.

In the first year of the studies, the value of the index of water use in the photosynthesis (ω_F) varied, depending on the growth phase of strawberries. For example, in the phase of fruiting, the largest value of this index (8.79 μmol·mmol^{-1}) was recorded in the plants using the

Table 4. Parameters of gas exchange of strawberry 'Elsanta'

Year	Dose of Agro-HydroGel [g·dm^{-3}]	The development stage of plants		
		flowering	fruiting	after fruiting
Stomal conductance for water (g_S) [mol·m^{-2}·s^{-1}] (% of control)				
I	0	0.75 a* (100)	0.20 a (100)	0.48 a (100)
	1.8	0.78 a (104.0)	0.39 a (195.0)	0.44 a (91.7)
	3.6	0.77 a (102.7)	0.50 a (250.0)	0.63 a (131.2)
Mean		0.77	0.36	0.52
II	0	0.36 a (100)	0.22 a (100)	0.70 a (100)
	1.8	0.48 a (133.3)	0.34 a (154.5)	0.66 a (94.3)
	3.2	0.64 a (177.8)	0.38 a (172.7)	0.83 a (118.6)
Mean		0.49	0.31	0.73
Concentration of carbon dioxide (c_i) in the intercellular spaces [µmol·mol^{-1}] (% of control)				
I	0	135.7 a (100)	275.6 b (100)	45.7 a (100)
	1.8	176.5 b (130.1)	227.6 a (82.6)	91.0 ab (199.1)
	3.6	146.7 ab (108.1)	201.0 a (72.9)	123.0 b (269.1)
Mean		153.0	234.7	86.6
II	0	111.0 a (100)	135.4 b (100)	46.3 a (100)
	1.8	97.3 a (87.6)	98.8 a (73.0)	102.0 b (220.3)
	3.6	106.7 a (96.1)	141.1 b (104.2)	112.3 b (242.5)
Mean		105.0	125.1)	86.9

*Explanation: see Table 2

1.8 g·dm^{-3} dose of hydrogel, whereas after fruiting, in the control plants (13.28 µmol·mmol^{-1}). In the subsequent year, the largest effectiveness of water use, in each of the growth phases, was characteristic of the plants grown in the medium without the supersorbent. At all the dates of the measurement, a larger value of ω_F was shown by the plants growing in the medium with the addition of 1.8 g of AgroHydroGel·dm^{-3}, as compared to the plants using the 3.6 g·dm^{-3} dose. This relationship appeared in the phase of fruiting in particular (Tab. 5). Klamkowski and

Table 5. Index of water use in the photosynthesis (ω_F) [mmol·mol^{-1}] in the leaves of strawberry 'Elsanta'

Year	Dose of AgroHydroGel [g·dm^{-3}]	The development stage of plants		
		flowering	fruiting	after fruiting
(% of control)				
I	0	7.65 b* (100)	5.45 a (100)	13.28 b (100)
	1.8	5.29 a (69.10)	8.79 b (161.3)	9.76 a (73.5)
	3.6	7.80 b (102.0)	6.29 a (115.4)	10.44 a (78.6)
Mean		6.91	6.86	11.16
II	0	19.66 b (100)	23.15 b (100)	12.16 b (100)
	1.8	9.27 a (47.1)	17.79 ab (76.8)	10.47 a (86.1)
	3.6	7.31 a (37.2)	13.85 a (59.8)	8.88 a (73.0)
Mean		12.08	18.26	10.5

*Explanation: see Table 2

Treder (2006, 2008) report that the response of plants to water deficiency may be to increase water use efficiency in photosynthesis.

CONCLUSIONS

1. The 3.6 g dose of AgroHydroGel·dm^{-3} applied to the medium caused a decrease in the yields of fruit of the studied variety of strawberry.
2. Differentiated doses of the applied supersorbent did not have any significant influence on the weight and the diameter of the individual fruit.
3. Along with the increase in the dose of AgroHydroGel, an increase in the content of the extract and L-ascorbic acid and a decrease in the accumulation of nitrates and nitrites in strawberry fruit were observed.
4. A direct influence of the applied gel polymer on the increase in the accumulation of the CO_2 assimilation in the leaves of strawberry in the phase of fruiting was observed. In the subsequent year, the significantly largest photosynthetic activity was observed in the control plants .
5. In the first year of the studies, the intensity of transpiration of strawberry in the phases of fruiting and after fruiting increased along with the increase in the doses of AgroHydroGel, whereas in the subsequent year such a relationship was observed in the phase of plant flowering.
6. The largest index of effectiveness of water use in the photo-

synthesis in the subsequent year, in all the growth phases, was characteristic of the control plants.

7. The applied supersorbent did not have any influence on stomatal conductance for water and its influence on the concentration of CO_2 in intercellular spaces was differentiated and equivocal.

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OCENA BEZPOŚREDNIEGO I NASTĘPCZEGO WPŁYWU SUPERSORBENTA POLIMEROWEGO NA PLONOWANIE ORAZ AKTYWNOŚĆ WYMIANY GAZOWEJ TRUSKAWKI (*Fragaria ananasa* Duch.) ‘ELSANTA’

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STRESZCZENIE

W latach 2007-2008 w Hali Wegetacyjnej Zachodniopomorskiego Uniwersytetu Technologicznego w Szczecinie przeprowadzono doświadczenie wazonowe, w układzie kompletnej randomizacji, na truskawce odmiany ‘Elsanta’. Czynnikiem doświadczalnym była dawka polimeru żelowego AgroHydroGel (zastosowano 1,8 oraz 3,6 g·dm^{-3}) dodawanego do podłoża przed posadzeniem roślin. W roku 2007 oceniano jego wpływ bezpośredni oraz w roku 2008 wpływ następczy na wielkość i jakość plonu oraz aktywność fizjologiczną truskawki. Stwierdzono, że zastosowana większa dawka supersorbenta spowodowała zmniejszenie plonu owoców truskawki. Zróżnicowane dawki AgroHydroGelu nie wywarły istotnego wpływu na masę pojedynczego owocu (7,89-9,31 g) oraz średnicę podłużną (27,5-30,0 mm) i poprzeczną (27,5-29,3 mm). Wraz ze wzrostem dawki AgroHydroGelu stwierdzono zwiększenie zawartości ekstraktu i kwasu L-askorbinowego oraz zmniejszenie kumulacji azotanów i azotynów w owocach truskawki. W fazie owocowania zaobserwowano bezpośredni wpływ zastosowanego polimeru na zwiększenie asymilacji CO_2 w liściach truskawki. W pierwszym roku badań intensywność transpiracji truskawki w fazach owocowania i po owocowaniu rosła wraz ze wzrostem dawek AgroHydroGelu, w roku następczym zaś zależność taką stwierdzono w fazie kwitnienia roślin. Największy wskaźnik efektywności wykorzystania wody w fotosyntezie w roku następczym, we wszystkich fazach rozwojowych, miały rośliny kontrolne.

Słowa kluczowe: *Fragaria ananasa* Duch., AgroHydroGel, plonowanie, wymiana gazowa