EFFECT OF SOME NUTRIENT APPLICATIONS ON PLANT PROPERTIES IN ORGANIC STRAWBERRY PRODUCTION

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Abstract

This study was conducted with the "Camarosa" strawberry cultivar at the Egirdir Horticultural Research Institute between 2004 and 2006. In these experiments, the impact of some nutrition applications upon plant development in conventional and organic production has been analyzed. The planting has been performed with frigo plants in the third week of July and black plastic mulch was used for mulch system and dripping method was used for watering system in the experiment. When evaluating the data of two years statistically according to plant width, plant stem number, leaf number and root length, the difference in both applications and years has given importance.

INTRODUCTION

While the tendency for organic strawberry production is increasing nowadays, the market share of this product is also getting bigger. However, in order to facilitate better comprehension of organic strawberry production by the producers the process of organic strawberry production form the beginning (plant nutrition, fight against disease and insects, cultural processes etc.) to supply to the market should be learned carefully.

According to 2005 production of Turkey, strawberry production has importance with a production amount of 160.000 tons, of which 4.616 tons (3,077 %) is organic production (Anonymous, 2006). One of the most commonly cultivated species in the world is "Camarosa". This species can be cultivated easily in all climates where the winter is not too cold such as

Florida South America, Australia, Italy, New Zealand, South Africa, Mexico, and Spain.

Kepenek et al.(2002), mentions that they have found the solution of plant length of camarosa type as 19,65 cm in their autumn planting with fresh plant. Riyaphan et al. (2005), mention in their study carried out in Thailand a changing of root length between 19,63-22,15 cm in Tioga and Tochiotome strawberry cultivar.

MATERIAL AND METHOD

This study was conducted in Egirdir Horticultural Research Center (Isparta/Turkey) between the years 2004-2006. As plant material, strawberry plants of Camarosa cv., as commonly used in organic production conditions was used in this experiment. Frigo plants were planted in the 3rd week of July. In this study plant length, width, stem number, leaf number and root length was evaluated after plants were treated with the applications described below

Applications: 1- Organic production (OP): 15 different feeding applications and no fertilizer applied (OP-C) 2-Conventional production (CP), 3- Control (C) which does not have feeding and pest control application. For feeding applications; in organic production, farm manure (FM) that 40 tons/ha, green fertilizer (OP-GF) that *Vicia sativa* L 100 kg seed/ha, Clinoptilolite (OP-Kln) that 1500kg/ha, sea alg (OP-SA) that *Ascophyllum nodosum* 2700 kg/ha used and combinations of these materials. Properties of these applications are the following: OP-FM 0,68% N, 0,39% P_2O_5, 0,31% K_2O; OP-SA auxin, cytokinin and 0,75% N, 1% P_2O_5, 16% K_2O, 30 ppm B, 290 ppm Fe, 0,20% Mg, 12 ppm Cu, 56 ppm Zn, 2,90% S; OP-Kln; 85-95% clinoptilolit 4,46% K_2O%, 1,21% Fe_2O_3, 0,83% MgO, 0,02 %P_2O_5, 38 ppm Mn, 24,2 ppm Zn, 2,9 ppm Cu, 10 ppm B. In conventional production, fertilization was done according to soil analyses: prior planting a nitrogen application of 90 kg/ha; in the first year nitrogen and potassium in the amount of 90 kg/ha and 80 kg/ha, respectively and in the second year nitrogen, phosphor and potassium were applied with 90 kg/ha, 60 kg/ha and 100 kg/ha respectively.

Due to leaf analysis at flowering season of the second year Fe deficiency was determinated. So in addition, Fe (0,8 kg/ha) application was made two times to both organic parcels and conventional parcels end of the flowering season of the second year.

RESULTS AND DISCUSSION

Plant length: Plant length data are given in table 1**.** Statistically difference (1% importance) were found between the years only. According to data the first year average have found as 32,31 cm while the second year average have found as decreased to 29,67 cm. This is due to the fact that the plant is getting older compared to the first year or not getting enough feeding.

Plant width: Statistically the difference (1% importance) were found applications and between the years (Table 1). According to the data the most high level have found from OP-FM+OP-SA application the first year (50,68 cm), and the second year (52,00 cm).

Stem Number: Plant stem number data are given in table 2**.** Statistically difference (1% importance) were found applications and between the years. According to the data the most high level have found from OP-FM+OP-GF+OP-Kln+OP-SA (5,33 units) application for the first year, and for the second year from the CP (7,57 units).

Leaf Number : Leaf number data are given in table 2. Statistically difference (1% importance) were found applications and between years. According to the data the most high level have found from OP-FM+OP-GF+OP-Kln (109,40 units) application for the first year, and for the second year from the CP (129,60 units). Polat (2005, in his survey of organic strawberry cultivation in Ankara conditions obtained the highest leaf number from FM + GF (51,04 units) and from nitrogen (49,13 units) application. Our results are higher when compared with this results.

Root Length: Statistically difference (1% importance) were found applications and between the years (Table 3). According to the data the most high level have found from OP-FM+OP-GF (19,51cm) application for the average two years.

Organic strawberry researchs are new in Turkey. End of the research, effects of some nutrient applications on plant properties were found in organic strawberry production for Egirdir (Isparta) region.

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Table 1. Plant length and width values

Applications	Plant length (cm)			Plant width (cm)		
	2005	2006	Average	2005	2006	Average
OP-FM	33,29	31,07	32,18	47,59	44,47	46,03 [a-c]
OP-GF	31,64	30,07	30,85	46,89	48,27	47,58 [a-c]
OP-Kln	33,65	29,27	31,46	46,72	48,97	47,85 [a-c]
OP-SA	32,75	30,56	31,66	49,23	50,77	50,00 [ab]
OP-FM+OP-GF	32,87	29,87	31,08	47,87	45,49	46,18 [a-c]
OP-FM+OP-Kln	34,56	30,47	32,51	48,75	49,53	49,14 [a-c]
OP-FM+OP-SA	34,08	31,13	32,61	50,68	52,00	51,34 [a]
OP-FM+OP-GF+OP-Kln	32,87	28,47	30,67	48,05	47,31	47,68 [a-c]
OP-FM+OP-GF+OP-SA	29,73	30,33	30,03	45,56	45,58	46,57 [a-c]
OP-FM+OP-GF+ OP-Kln+OP-SA	32,35	29,47	30,91	45,20	51,13	48,16 [a-c]
OP-FM+OP-Kln + OP-SA	32,41	30,27	31,34	46,99	50,13	48,56 [a-c]
OP-GF + OP-Kln	31,48	28,13	29,81	46,33	49,80	48,07 [a-c]
OP-GF + OP-SA	31,57	31,07	31,32	46,39	49,73	48,06 [a-c]
OP-GF + OP-Kln + OP-SA	31,91	28,46	30,19	46,52	46,48	46,50 [a-c]
OP-Kln + OP-SA	33,81	31,12	32,52	46,43	50,38	48,40 [a-c]
OP-C	30,13	27,53	28,83	45,36	45,42	45,39 [bc]
CP	33,51	30,79	32,15	48,22	50,93	49,57 [a-c]

C	29,58	25,83	27,71	45,13	41,87	43,50 [c]
Average	32,31 [a]	29,67 [b]	30,99	47,04 [b]	48,29 [a]	47,70
$LSD_{\%5}$ (year)	0,65 **			1,13 **		
$LSD_{\%5}$ (application)	ns			6,12 **		

Table 2. Stem and Leaf number values

Applications	Stem number (unit)			Leaf number (unit)		
	2005	2006	Average	2005	2006	Average
OP-FM	4,16	5,46	4,81 [c-e]	90,88	125,37	108,13 [ab]
OP-GF	4,27	5,87	5,08 [b-e]	96,56	126,20	111,31 [ab]
OP-Kln	3,69	5,88	4,79 [c-e]	90,43	111,40	101,92 [a-c]
OP-SA	4,05	6,10	5,08 [b-e]	87,32	130,00	108,66 [ab]
OP-FM+OP-GF	4,49	5,19	4,84 [c-e]	98,40	104,13	101,27 [a-c]
OP-FM+OP-Kln	4,13	5,52	4,83 [c-e]	99,00	127,73	113,37 [a]
OP-FM+OP-SA	4,16	6,53	5,35 [a-d]	97,94	108,40	103,17 [a-c]
OP-FM+OP-GF+OP-Kln	4,84	5,33	4,89 [c-e]	109,40	123,87	116,63 [a]
OP-FM+OP-GF+OP-SA	4,85	6,71	5,78 [a-c]	91,08	142,84	116,96 [a]
OP-FM+OP-GF+ OP-Kln+OP-SA	5,33 [j]	6,83	6,08 [ab]	93,76	119,93	106,85 [ab]
OP-FM+OP-Kln + OP-SA	4,55	6,22	5,39 [a-d]	97,00	123,67	110,33 [ab]
OP-GF + OP-Kln	4,51	5,31	4,92 [c-e]	96,40	101,73	99,07 [a-c]
OP-GF + OP-SA	4,17	6,06	5,12 [a-e]	91,20	127,60	109,40 [ab]
OP-GF + OP-Kln + OP-SA	4,44	5,73	5,09 [b-e]	95,88	105,57	100,73 [a-c]
OP-Kln + OP-SA	4,40	5,84	5,12 [a-e]	88,56	113,57	101,07 [a-c]
OP-C	3,81	4,53	4,17 [e]	76,27	92,48	84,37 [c]
CP	4,93	7,57	6,25 [a]	101,80	129,60	115,70 [a]
C	3,64	4,93	4,28 [de]	87,32	92,80	90,06b [c]
Average	4,36 [b]	5,84 [a]	5,13	93,63 [b]	115,59 [a]	104,61
$LSD_{\%5}$ (year)	0,21 **			4,01 **		
$LSD_{\%5}$ (application)	1,13 **			21,50 **		

Table 3. Root length values

Applications	Root length (cm)		
	2005	2006	Average
OP-FM	17,26	18,73	18,00 [a-c]
OP-GF	17,89	19,47	18,68 [ab]
OP-Kln	17,30	17,67	17,49 [a-d]
OP-SA	16,05	16,59	16,32 [b-d]
OP-FM+OP-GF	18,33	20,69	19,51 [a]
OP-FM+OP-Kln	17,09	17,67	17,38 [a-d]
OP-FM+OP-SA	17,09	20,51	18,80 [ab]
OP-FM+OP-GF+OP-Kln	17,19	18,23	17,71 [a-d]
OP-FM+OP-GF+OP-SA	17,79	18,06	17,93 [a-c]
OP-FM+OP-GF+OP-Kln+OP-SA	16,41	18,00	17,20 [a-d]
OP-FM+OP-Kln + OP-SA	16,92	19,06	17,89 [a-c]
OP-GF + OP-Kln	16,52	17,40	16,96 [b-d]
OP-GF + OP-SA	17,32	19,00	18,16 [a-c]
OP-GF + OP-Kln + OP-SA	15,41	17,53	16,47 [b-d]
OP-Kln + OP-SA	16,28	16,80	16,54 [b-d]
OP-C	14,53	14,97	14,75 [d]
CP	15,13	15,49	15,31 [cd]
C	15,25	16,33	15,79 [cd]
Average	16,54 [b]	18,06 [a]	17,23
$LSD_{\%5}$ (year)	0,59 **		
$LSD_{\%5}$ (application)	3,19 **		