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EFFECT OF DIFFERENT ORGANIC FERTILIZERS ON GROWTH AND FRUITING OF PLUM TREES "JAPANESE AND DORADO CVS."

BY

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ABSTRACT

This study was performed under El-Kanater, Qalyoubia Governorate conditions during the two successive seasons of 2005 and 2006 to compare the effect of four types of organic fertilizers (cattle, sheep, rabbit and horses manures) on the vegetative growth, yield and fruit quality of plum trees (Japanese and Dorado cvs.).

The four studied manures increased shoot diameter and leaf area as compared to the control (traditional fertilization). All types of manures increased fruit weight and size as compared with the control fertilizers. Rabbit manure gave the highest fruit number, yield/tree and yield/Feddan as compared with the control or the other manure fertilizers. All used manures increased leaf nitrogen, phosphorus and potassium contents as compared to the control.

INTRODUCTION

The plum (*Prunus salicina*) tree related to Japanese group and Rosaceae family. The plum trees area in Egypt decreased from 8155 faddens in 1993 to 3118 feddans in 2006 as a result of tree decline and unfruitfulness. This misuse of chemical fertilizers resulted in the disturbance of natural biological balance in the soil. It is well known that organic manure fertilizers are the best alternatives for chemical fertilizers. Organic manures are composed mainly of wastes and residues from plant and animal life. They contain much carbon and relatively small percentages of plant foods usually that come from plants that fix the carbon (Marangoni *et al.*, 2004). Organic manures have many advantages as: (a) they supply some nutrients for plants and the carbon containing compounds are food for small animals and microorganisms, (b) they often improve the structure of soil; they may do this directly through their action as bulky diluvium in compacted soils or indirectly when the waste products of animals or microorganisms cement soil particles together, (c) these structural improvements due to organic manure increase the amount of available water to crops that soil can hold, (d) they also improve aeration and drainage and encourage good root growth by providing enough pores of the right sizes and preventing the soil from becoming too rigid when dry or completely over logged and devoid of air when wet, (e) reduce the quantity of recommended inorganic fertilizers and (f) they are cheaper than chemical fertilization (Rathi and Bist, 2004 and Shaddad *et al.*, 2005). There are several sources of organic manure, but the most used everywhere are cattle, poultry, rabbit and sheep manures for that several investigations has been done. Many researchers studied the effect of some organic manure fertilizers treatments on increasing productivity and improving fruit quality Sekiya *et al.*, 1983 on Satsuma mandarin, Gasanov, 1984 on persimmon, Kalu-Singh *et al.*, 1984 on mango; Darfeld and Lenz 1985, on pear); Villasurda and Baluyut 1990, on guava; Rabeh *et al.*, 1993, on Balady mandarin; Li *et al.*, 1998 on pot cultured apple; El-Kobbia 1999 on Washington navel orange; Marangoni *et al.*, 2004 on stone fruits and Rathi and Bist, 2004 on pear).

Sekiya *et al.* (1983) pointed out that in Stasuma mandarin 40 or 80% of nitrogen fertilization requirement was satisfied with the equivalent amount of nitrogen in the form of farmyard manure (FYM). The results showed that FYM had no effect on fruit quality.

Derfeld and Lenz (1985) fertilized pear trees with light different combinations of N, P and k with or without Farmyard manure (FYM), over a 16-year period, they observed that there was a positive effect on yield and fruit quality due to organic manures which reduced the quantity of recommended inorganic fertilizers.

Song *et al.* (1999) conducted on experimentation orchard planted with Nagano-2 Fuji apple on M26 in rootstock and was fertilized with organic manure is an important aspect influencing quality.

Salama (2002) compared the effect of three types of organic manure namely: Cattle, poultry and sheep on fruit quality of Balady mandarin trees grown in sandy soil. The results declared that the studied fruit physical and chemical properties were greatly enhanced due to poultry manure rather than cattle manure. Also, experiments on fruit plants showed that cow manures effectively influenced fruit quality (Marangoni *et al.*, 2004).

On the other hand, the application method of organic manure material affect the utilization and efficiency of organic manure. In this respect, Moustafa (2002) on Washington navel orange mentioned that the application of organic manure (cattle, rabbit, sheep and poultry) in trenches increased the utilization and efficiency of organic manure which reflected in better growth, higher leaf mineral content, higher tree yield and better fruit quality rather than superficial application.

The aim of this work is to study the effect of different organic fertilizers on tree growth, leaf mineral contents, tree yield and fruit quality.

MATERIALS AND METHODS

The present investigation has been conducted at the experimental orchard located at El-Kanater Horticultural Research station, Qalyoubia, Governorate. The experiment has been extended for two consecutive of 2005 and 2006 on fruitful trees of two plum cultivars (Golden Japanese and Adordo). The selected trees were about 18-year-old, budded on Mariana rootstock and planted at 6 meters space in a square system on clay loamy soil . This study was performed to throw some light on the organic cultivation through the evaluation of the effect of different organic manure sources namely cattle, horses, sheep and rabbit in addition to mineral fertilizers (2 Kg. ammonium sulphate + 1.5 Kg. potassium sulphate + 1.5 kg. calcium super phosphate/ tree /year) compared with the control (mineral fertilizers only. The organic manure application method was trench application. In late December of each season, two trenches (80 cm length x 25 width x 30 cm depth) were digged along both sides of the tree at one meter apart from tree trunk in the direction of irrigation furrows. Thereafter, the calculated amount of each organic manure source (cattle, horses, sheep and rabbit) was equally divided into two halves and applied in the two trenches (half amount of each organic manure source/trench) and covered with trench soil.

Table (1): Chemical analysis of the tested organic manure sources (cattle, cheep, rabbit and Horse) used in plum trees.

Organic manure source	Nitrogen %	Phosphorus %	Potassium %
Cattle	1.4	0.085	0.85
Cheep	1.6	0.130	0.95
Rabbit	1.7	0.175	0.85
Horse	1.4	0.140	1.10

1- Tree growth:

Four branches, nearly uniform in diameter (about 3 cm in diameter) and length well distributed around the periphery of each treated tree (one branch per each side) were selected and tagged . Thereafter at the end of the growing season when the growth ceased, mean shoot length increase was determined as follows:

Shoot length increase = Differences between the initial and final measuring values of shoot length.

Moreover, of each growing season, leaves of the labelled shoots on each treated tree were counted and the average increase in number of leaves was determined as follows:

Increase in No. of leaves = Differences between the initial and final counts of number of leaves.

2- Leaf mineral content:

Leaf samples (0.1 g dry weight) were taken (at 15 August) from the third leaf from shoot base, washed, air dried at 70 °C, ground and digested according to Chapman and Pratt (1978). Nitrogen was determined by the Micro-Kjeldahl method (Pregl, 1945). Phosphorus was estimated by the method of Troug and Meyer (1929). Potassium was determined by Flame-photometer according to Brown and Lilleland (1946).

3-Fruit set and fruit drop percentages:

The total number of flowers of the previously four tagged shoots per each treated tree was counted and recorded during full bloom Moreover, number of fruitlets was also counted at fruit set Fruit set percentages were calculated on the basis of the initial number of flowers at full bloom. Furthermore, the number of retained and dropped fruits was counted of each season and fruit drop percentages were calculated on the basis of number of set fruits.

4-Tree yield:

The treated trees were harvested as the fruits attained the maturity indices. Accordingly, fruits of each treated tree were picked weighed and counted. Thus, yield was determined either as kg/tree; as ton/feddan, or number of fruits per tree or per Kg. Moreover, these data were used in estimating yield monetary value considering a farmgate price of LE 3.0/Kg. The present results, also used to calculate the percentage of yield increment/ control = (fruit yield of treatment – fruit yield of control) x 100 ÷ fruit yield of control.

5-Fruit quality:

Samples of ten fruits from each replicate were collected at harvesting time and the following characters were determined: fruit physical characteristics including fruit weight (gm), size (ml) and fruit firmness ($lb/inch^2$). Besides, fruit chemical properties including juice TSS % by handy refractometer, total acidity % as malic acid in fruit juice according to A.O.A.C. (1990) and Vogel (1968) were determined and TSS /acid ratio was estimated. The investigated treatments were in a complete randomized block design with three replicate for each treatment, whereas each replicate was represented by a single tree. All the obtained data in the two seasons were statistically analyzed using the analysis of variance method according to Snedecor and Cochran (1990) whereas differences between means were compared using Duncan's multiple range test at 0.05 level (Duncan, 1955).

RESULTS AND DISCUSSION

Vegetative growth:

a) Shoot length and diameter:

The results in Table (2) show the effect of different types of manure (cattle, sheep, rabbit and horses manures) on shoot length and diameter. The averages of different types of manures decreased shoot length and increased shoot diameter as compared to the control. The highest shoot lengths (77.18 and 77.07 cm) were obtained by the control treatments in the two seasons of the study, respectively as compared to the other types of manures which recorded low values than the control. However the horse manure gave the highest values of shoot diameter (8.34 and 8.72 mm) in the two seasons of the study, respectively as compared to the control (5.45 and 5.63 mm), may be as a results of much

nutrients content, while the other manures gave in between values. The Dorado plum gave better shoot diameter than the Japanese cv.

b) Number of leaves/branch:

Number of leaves/ branch as affected by different manure fertilizers are shown in Table (2). The control treatment gave the highest numbers of leaves/branch (38.18 and 38.68 leaves/branch) in the two studied seasons, respectively, may because they were longer, while the other types of manures were lower than the control. The Japanese cultivar gave higher number of leaves/branch than the Dorado plum cultivar.

The present results are in line with those of Salama (2002) on Balady mandarin; and Moustafa (2002) on Washington navel orange.

Table (2): Effect of different organic fertilizers on shoot length and diameter and number of leaves/branches during 2005 and 2006 seasons.

Treatments	Shoot length (cm)					
	J. Plum		D. Plum		Average (A)	
	2005	2006	2005	2006	2005	2006
Cattle manure	63.78 e	60.5 d	59.33 f	62.0 c	61.56 D	61.25 B
Cheep manure	70.48 d	5573 f	59.0 fg	60.28 d	64.74 C	58.1 C
Rabbit manure	57.67 g	58.1 e	63.17 e	64.68	60.42 E	61.39 B
Horse manure	80.22 a	54.33 g	56.83 h	57.88 e	68.53 B	56.11 D
Control	75.9 c	76.67 a	78.47 b	77.47 a	77.18 A	77.07 A
Average (B)	69.61 A	61.07 B	63.36 B	64.46 A	--	--
L.S.D. at 5% for						
A =				0.885	0.651	
B =				01.104	0840	
A* B =				1.561	1.188	
	Shoot diameter (mm)					
Cattle manure	6.43 cd	6.53 g	83a	8.22 e	7,38 B	7.38 C
Cheep manure	7.18 bc	7.22 f	8,2 a	8.45 d	7.69 AB	7.84 B
Rabbit manure	8.04 ab	8.89 b	8.26 a	8.66 c	8.13 A	8.78 A
Horse manure	7.93 ab	8.22 e	8.75 a	9.22 a	8.34 A	8.72 A
Control	5.07 e	5,23 i	5.83 de	6.03 h	5.45 C	5.63 D
Average (B)	6.92 B	7.22B	7.87 A	8.12 A	--	--
L.S.D. at 5% for						
A =				0.486	0.103	
B =				0.627	0.133	
A* B =				0.886	0.188	
	Number of leaves/branch					
Cattle manure	38.45ab	36.12 b	31.33 cd	31.75 cd	34.89 C	33.93 B
Cheep manure	32.37 c	32.62 c	28.37 g	29.95 e	30.37 D	31.28 C
Rabbit manure	31.87 c	31.47 d	30.47 d	30.58 de	31.17 C	31.27 C
Horse manure	29.17 f	28.82 e	29.67 f	30.32 de	29.42 E	29.57 D
Control	38.87 a	40.87 a	37.5 b	36.5 b	38.18 A	38.68 A
Average (B)	34.14 A	34.o7 A	31.47 b	31.82 B	--	--
L.S.D. at 5% for						
A =				0.614	0.902	
B =				0.792	1.164	
A* B =				0.120	1.646	

J = Japanese D = Dorado

c) Leaf area:

Result in Table (3) clear the effect of different manure types on leaf area of two cultivars of plum (Japanese and Dorado). All different types of manures increased significantly leaf area as compared to the control in the two studied cultivars. The highest leaf area (17.67 and 17.33 cm^2) was observed by using cheep manure in the two studied seasons, respectively, while rabbit manure was supreme in the 1st season.

Fruit set:

Fruit set (%) as affected by different manures during 2005 and 2006 seasons is presented in Table (3). Rabbit manure gave the highest fruit set values (8.98 and 9.35%%) in the two studied seasons, respectively as compared with other types of fertilizers. On the other hand, the cattle manure gave the lowest fruit set values, the other manures gave in between values.

Table (3): Effect of different organic fertilizers on leaf area (cm^2), fruit set and weight during 2005 and 2006 seasons.

Treatments	Leaf area (cm2)					
	J. Plum		D. Plum		Average (A)	
	2005	2006	2005	2006	2005	2006
Cattle manure	14.82 cd	14.19 e	15.59 c	14.72 d	15.28 B	14.46 B
Cheep manure	15.94 c	15.04 cd	19.39 b	19.62 a	17.67 A	17.33 A
Rabbit manure	11.47 e	11.40 h	23.27 a	17.37 b	17.37 A	14.38 B
Horse manure	11.93 e	11.93 g	15.68 c	15.33 c	13.81 C	13. 63 C
Control	11.21 e	11.81 g	14.13 d	13.13 f	12.67 D	12.67 D
Average (B)	13.07 B	12.87 B	17.61 A	16.03 A	–	–
L.S.D. at 5% for						
A =				0.577	0.218	
B =				0.745	0.262	
A* B =				1.053	0.399	
	Fruit set (%)					
Cattle manure	8.57 bc	8.o9 e	7.29 f	6.6 h	7.93 CD	7.35 E
Cheep manure	8.84 bc	8.92 c	7.69 ef	7.77 f	8.27 BC	8.35 C
Rabbit manure	9.43 a	10.04 a	8.53 bc	8.66 d	8.98 A	9.35 A
Horse manure	8.98 ab	9.35 b	8.17 e	8.12 e	8.57 AB	8.73 B
Control	8.14 de	8.27 e	7.28 f	7.25 g	7.71 D	7.76 D
Average (B)	8.79 A	8.93 A	7.79 B	7.68 B	–	–
L.S.D. at 5% for						
A =				0.347	0. 126	
B =				0.447	0.163	
A* B =				0.633	0.230	
	Fruit weight (g)					
Cattle manure	39.9 a	51.34 b	32.94 bc	43.74 c	36.42 A	47.54 C
Cheep manure	36.71 ab	43.22 c	28.89 d	54.58 a	32.8 BC	48.9 B
Rabbit manure	34.95 b	53.68 a	30.69 cd	54.13 a	32.82 BC	53.90 A
Horse manure	39.1 a	52.03 b	30.36 cd	43.98 c	34.73 AB	48.01 BC
Control	54.57 b	35.43 d	27.97 d	28.97 e	31.27 C	32.20 D
Average (B)	37.04 A	47.14 A	30.17 B	45.08 B	–	–
L.S.D. at 5% for						
A =				2.113	0.865	
B =				2.729	1.117	
A* B =				3.859	1.580	

J = Japanese D = Dorado

Fruit weight and size.

Results in Tables (3 and 4) show the effect of different manures on fruit weight and size during 2005 and 2006 seasons. All types of manures increased fruit weight and size as compared with the control fertilizers. However, fruit weight and size were better with cattle manure (36.4 g and 37.3 ml) as well as in the 1st season rabbit manure (53.9 g and 53.0 ml) in the 2nd season than other treatments.

Table (4): Effect of different organic fertilizers on fruit size during 2005 and 2006 seasons.

Treatments	Fruit size (ml)					
	J. Plum		D. Plum		Average (A)	
	2005	2006	2005	2006	2005	2006
Cattle manure	40.33 a	53.33 a	34.33 e	42.33 d	37.33 A	47.83 B
Cheep manure	37.67 bc	40.0 e	29.0 g	53.33 a	33.33 C	46.67 C
Rabbit manure	36.33cd	53.33 a	31.67 f	52.67 b	34.0 BC	53.0 A
Horse manure	38.33 b	52.33 b	31.67 f	43.0 c	35.0 B	47.67 B
Control	35.0 de	36.0 f	28.33 g	30.33 g	31.67 D	33.17 D
Average (B)	37.53 A	47.0 A	31.0 B	44.33 B	--	--
L.S.D. at 5% for						
A =				0.888	0.302	
B =				1.146	0.389	
A* B =				1.621	0.551	

J = Japanese D = Dorado

Fruit firmness (lb/Inch^2):

Fruit firmness values as affected by different manures are presented in Table (5). Fruit firmness values differ from season to season where cheep manure gave the highest fruit firmness (11.56 lb/Inch^2) in the first season, while the horse manure gave the highest fruit firmness (10.93 lb/Inch^2) in the second season as compared to the control and other types of fertilizers. However, higher fruit firmness of cheep and horse manures may be as a result of smaller fruits. The response of plum Dorado cultivar to the different fertilizers was better than Japanese one.

T.S.S., Acidity and TSS/acid ratio:

Results in Table (5) clear the effect of different types of manures on fruit T.S.S. (%) and acidity (%). The cheep manure fertilization gave the highest T.S.S. values (11.92 and 12.52%) as well as the lowest acidity values (0.681 and 1.003%), for the two studied seasons, as compared to the control and other treatments. The TSS/acid ratio differ from season to season and did not gave similar trend in the two seasons of the study. Both plum cultivars (Japanese and Dorado) response to all fertilizers are similar in the two studied seasons.

Number of fruits/tree and fruit yield/tree:

Table (6) results clear the effect of different manures on plum fruit number/tree and fruit yield/tree for the two studied cultivars during the two seasons (2005 and 2006). The rabbit manure gave the highest average of number of fruits/tree (835 and 900) for the first and second seasons, respectively while horse manure was better through the 2nd season as compared to the other manures and the control. In this respect, Japanese plum cultivar produced the higher number of fruits/tree than the Dorado one as the averages of all fertilizers. The highest values of fruit yield/tree (27.57 and 48.39 Kg./tree) were obtained by using rabbit manure fertilizer as compared to the other manures in the first and second season, respectively. As an average of all manures, Japanese plum gave the highest yield/tree as compared to the Dorado plum in the two studied seasons.

The present results are in harmony with those of Salama (2002) on Balady mandarin; and Moustafa (2002) on Washington navel orange.

Yield monetary value and yield increment:

Rabbit and horse manures registered significantly higher yield monetary value (LE 145.2 and 113.2/tree) and percentage of yield increment (166.3 and 110.8% than control). Data in Table (8) also showed that yield monetary value and yield increment/control increased in the 2nd season than 1st one may be as a result of the beneficial effect of successive manure applications. It is also noticeable that plum grower can gain more money with Japanese plum variety than Dorado one. However, these results are supported by Marangoni *et al.* (2004) on stone fruits; Rathi and Bist (2004) on pear as well as Shaddad *et al.* (2005) on apricot.

Leaf mineral content:

Nitrogen, phosphorus and potassium contents (%) as affected by the different manures during 2006 season are presented in Table (9). Rabbit manure gave the highest leaf N content (2.17%) as compared to the other fertilizers. All manures increased N content as compared to the control. Cattle manure gave the highest leaf P content (0.305%) as compared to other manure fertilizers As an averages of the two studied cultivars, there were no significant differences between the two cultivars as regard N and P contents. All manures increased leaf K content as compared to the control and cheep manure gave the highest Leaf K content (1.170) as compared to the other manures.

The present results agree with those of Moustafa (2002) on Washington navel orange, who reported that different manure fertilizers increased mineral content.

Table (7): Effect of different organic fertilizers on fruit yield/Feddan (Ton) and number of fruits per Kg. during 2005 and 2006 seasons.

Treatments	Fruit yield/Feddan (Ton)					
	J. Plum		D. Plum		Average (A)	
	2005	2006	2005	2006	2005	2006
Cattle manure	4.27 d	5.1 e	2.77 g	3.17 g	3.52 C	4.13 D
Cheep manure	4.50 c	5.83 d	2.67 g	5.17 e	3.58 C	5.5 C
Rabbit manure	5.70 a	9.07 a	3.67 e	7.2 c	4.68 A	8.13 A
Horse manure	5.17 b	7.7 b	3.4 f	4.93 e	4.28 B	6.32 B
Control	3.40 f	3.57 f	2.24 h	2.40 h	2.82 D	2.98 E
Average (B)	4.61 A	6.25 A	2.95 B	4.57 B	–	–
L.S.D. at 5% for						
A =				0.089	0.197	
B =				0.115	0.254	
A* B =				0.163	0.360	
	Number of fruits/Kg.					
Cattle manure	25.43 e	19.65 d	30.79 c	23.68 c	28.11 C	22.07 B
Cheep manure	27.73 d	23.2 c	34.97 a	20.21 d	31.35 B	21.67 B
Rabbit manure	28.73 d	19.04 d	32.636 b	18.55 d	30.68 B	21.71 B
Horse manure	23.17 f	19.87 d	32.99 b	24.28 c	28.08 C	18.8 C
Control	28.97 d	28.25b	33.89 a	34.64 a	32.43 A	31.44 A
Average (B)	26.81 B	22.0 B	33.45 A	24.27 A	–	–
L.S.D. at 5% for						
A =				0.654	0.860	
B =				0.884	1.110	
A* B =				1.193	1.570	

J = Japanese D = Dorado

Table (8): Effect of different organic fertilizers on yield monetary value and percentage of yield increment/control during 2005 and 2006 seasons.

Treatments	Yield monetary value/tree (LE)					
	J. Plum		D. Plum		Average (A)	
	2005	2006	2005	2006	2005	2006
Cattle manure	76.4	91.2	49.6	56.8	63.0	74.0
Cheep manure	80.5	104.3	48.0	92.1	64.3	98.2
Rabbit manure	99.4	162.0	66.1	128.4	82.7	145.2
Horse manure	92.8	138.2	60.8	88.1	76.8	113.2
Control	76.4	63.8	40.3	43.0	50.5	53.4
Average (B)	82.0	111.9	53.0	81.7	-	-
L.S.D. at 5% for						
A =				4.97	14.71	
B =				6.42	18.99	
A* B =				9.08	26.85	
	Yield increment/control (%)					
Cattle manure	25.6	43.0	23.9	32.0	24.8	37.8
Cheep manure	32.4	63.4	19.2	114.2	25.8	88.8
Rabbit manure	63.4	153.9	64.2	198.6	63.8	176.3
Horse manure	52.6	116.6	51.1	105.0	51.9	110.8
Control	0.0	0.0	0.0	0.0	0.0	0.0
Average (B)	34.8	75.4	31.7	90.0	-	-
L.S.D. at 5% for						
A =				5.34	13.92	
B =				7.72	17.80	
A* B =				10.61	28.34	

J = Japanese D = Dorado

* = (fruit yield of treatment – fruit yield of control) x 100 ÷ fruit yield of control.

Table (9): Effect of different organic fertilizers on leaf N, P and K content (%) during 2006 season.

Treatments	N (%)		Average (A)	P (%)		Average (A)	K (%)		Average (A)
	J. plum	D. plum		J. plum	D. plum		J. plum	D. plum	
Cattle manure	1.700de	2.300b	2.000C	0.301a	0.310a	0.305A	1.560ab	0.770e	1.170C
Cheep manure	2.43a	1.800cd	2.1200AB	0.263ab	0.263ab	0.263B	1.560ab	1.630a	1.600A
Rabbit manure	2.500a	1.88c	2.170A	0.273ab	0.293ab	0.283AB	1.220d	1.57ab	1.400B
Horse manure	1.73e	2.400a	2.07BC	0.290ab	0.230b	0.267AB	1.496b	1.390c	1.440B
Control	1.670e	1.730e	1.700D	0.263b	0.243b	0.253B	1.220d	0.770e	0.990D
Average (B)	2.010A	2.01A	--	0.278A	0.271A	--	1.410A	1.23B	--
L.S.D. at 5% for									
A =	0.0523			0.0297			0.0664		
B =	0.0675			0.0384			0.0858		
A* B =	0.0955			0.0543			0.1213		

J = Japanese D = Dorado

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مقارنة تأثير التسميد العضوى على نمووإثمار أشجار البرقوق صنفى اليابانى وألدورادو

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أجريت هذه الدراسة تحت ظروف القناطر الخيرية، محافظة القليوبية خلال موسمى ٢٠٠٥ و٢٠٠٦ لمقارنة تأثير أربعة أنواع من الأسمدة العضوية (سماد الماشية – سماد الأغنام – سماد الأرانب – سماد الخيول) على النموالخضري والمحصول وصفات جودة الثمار لأشجار البرقوق صنفى يابانى ودورادو.

نتج عن استعمال الأنواع الأربعة من الأسمدة العضوية زيادة قطر الأفرع وزيادة مساحة الأوراق عند المقارنة بالتسميد الغير عضوي. ونتج عن استعمال سماد الأرانب الحصول على أعلى عدد من الثمار وأعلى محصول لكل شجرة وأعلى محصول/فدان وأعلى عائد نقدي من الشجرة عند المقارنة بالكنترول والأسمدة العضوية الأخرى المستخدمة. ونتج عن التسميد بالأنواع الأربعة من الأسمدة العضوية زيادة محتوى الأوراق من النيتروجين والفوسفور والبوتاسيوم عند مقارنتها بالكنترول.