EVALUATION OF DIFFERENT TECHNIQUES TO SPRAY THE COMPOST TEA FOR ORCARD TREES

Sehsah, E. E.[*] and E. B. Belal[**]

ABSTRACT

The conventional sprayers, such as the gun sprayers were applied for the apple trees under Egyptian conditions. In organic apple production the growers tends to apply the compost tea as provide fertilizer and pesticides control. The objectives of this current research were to spray the compost tea by using the gun sprayer, air assisted backpack sprayer Suzuki (2.13 kW) and Tiazh. Qinili Machinery Knapsack. Also, investigated to use the yeast with the compost tea to improve and increase nutrient availability. The different techniques sprayers an air assisted backpack sprayer Suzuki (2.13 kW) and Tiazh. Qinili Machinery Knapsack sprayer (0.7 kW) achieving thorough coverage was compared to a conventional hydraulic sprayer (gun sprayer) to apply the bio fertilizer compost tea. Two different composts tea, the aerated compost tea (ACT1) and nun-aerated compost tea (ACT2), were applied under laboratory conditions. The 10 gm of yeast/10 liter was added for both compost teas (ACT) as the marker of the microorganism in the compost tea. Microscope with digital camera and software Image J V1.52 program was used to count the yeasts cells before and after spray treatment conditions. The conventional hydraulic sprayer (gun sprayer) gave a good result to apply the compost tea with low values of number of microorganisms (yeast cells). The low values of yeasts after treated main that there are a highest damage or crushed of yeast cells and the nutrition will be increasing. The viability numbers of yeast cells for conventional gun sprayer in ACT1 compost tea were 0.76 x 10^6 / ml and 0.52 x 10^6 / ml at operating pressure 390 kPa and 480 kPa respectively. As well as, the viability numbers of yeast cells for conventional gun sprayer in ACT2 compost tea were 0.84 x 10^6 / ml and 0.76 x 10^6 / ml at operating pressure 390 kPa and 480 kPa respectively.

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The values of number of yeast cells for ACT1 were 0.52 x 10^6 /ml, 2.60 x 10^6 / ml and 1.22 x 10^6 / ml for conventional sprayer, motorized an air assisted backpack sprayer Suzuki with 2.13 kW power and Tiazh Qinili Machinery Knapsack sprayer with 0.7 kW power respectively. The viability numbers of yeast cells for ACT2 were 0.63 x 10^6/ ml, 1.06 x 10^6 / ml and 0.82 x 10^6 / ml for conventional sprayer, motorized an air assisted backpack Suzuki sprayer and Tiazh Qinili Machinery Knapsack sprayer respectively. The viability numbers of yeast cells for the air assisted backpack Suzuki sprayer were 2.3 x 106 / ml and 4.6 x 10^6 / ml for ACT1 and ACT2 compost tea at half open throttle air position respectively. The conventional gun sprayer produced highly values of damage percentage compared to the T.Qinili sprayer and Suzuki sprayer. The percentage of damage yeasts cell in ACT1 were 97.25% and 96.08 % at operating pressure 480 kPa and 390 kPa respectively.

Keywords*: Organic fertilizer, sprayer*

INTRODUCTION

Organic fertilizers are increasingly playing a more important role as substitutes to chemical fertilizers, where most organic fertilizers are made out of many kinds of agricultural wastes such as animal dung and plant residues (Larptansuphaphal and Jitumroochokchai, 2009). (However, there are reports showing that using organic fertilizers increased the development of some diseases (Chauhan et al., 2000). In many studies, application of compost extracts (compost tea), which are filtrated solution of compost materials and water mixtures, showed promising results on crop protection after a soaking period referred to as"extraction time" (Ghorbani et al., 2006). The concept behind compost tea is quite simple, though the actual process of making compost tea becomes scientific and very complex. The idea is that compost (full of beneficial microorganisms) is mixed with water and then supplemented with nutrients for the growth of microorganisms. This procedure reduces the pollution caused by nutrients through reducing the amounts of fertilizers added to soil (Abou El-nour, 2002). The effects of compost application either as extracts to the foliage or as soil amendments on plant disease control may be due to direct antifungal or

resistance- inducing/plant-strengthening effects. However, the mechanism by which compost extracts work is not well known but seems to vary depending on the host-pathogen relationship and the mode of application (Goldstein, 2002). Moreover, several studies revealed that foliar application is more efficient than soil fertilization, under arid and semiarid conditions (Amberger, 1991; El-Fouly and El-Sayed, 1997). Also, organic fertilizers such as liquid pig manure, matured cattle manure, and sugarcane husks applied directly to the soil showed promising results in control of some crop diseases (Viana et al., 2000). Yeast extract is a natural component contains many of the nutrient elements and cytokininis, which is safe and non-pollutant. It has a considerable amounts of amino acids; mineral elements, carbohydrates, reducing sugars, enzymes and vitamins B1,2,3,12 (Khedr and Farid, 2000). Yeo et al., (2000) found that yeast extracts contain trehalose-6-phosphate synthase which is a key enzyme for trehalose bio synthesis. They suggested that the production of trehalose not only affects plant development but also improves drought tolerance. Many investigators reported that, spraying plants with yeast extract improved plant growth, yield and quality of many vegetable crops i.e. pea, tomato, potato, pepper and cucumber (Mahmoud, 2004). Moreover, El- Desuki and El-Gereadly (2006) reported that, the vegetative growth of pea plant, leaves content of photosynthesis pigments, free amino acids, *carbohydrates* and *cytokininis*, pod yield and quality as well as nutritive value were increased by increasing the concentration of yeast extract in spraying solution from 1% up to 3%. The current global scenario firmly emphasizes the need to adopt eco-friendly agricultural practices for sustainable agriculture (Fawzy et al., 2012). Recent attention has been given to decreasing pollution sources in modern agriculture. One of the approaches to reduce soil pollution is the use of bio-stimulants, which have become commonly used as a safety nature of plant growth regulators, polyamines and vitamins. Such compounds can also improve plant resistance and tolerance to environmental stresses (Kowalczyk and Zielony, 2008). Foliar application of yeast extract and ascorbic acid increased vegetative growth of eggplant (El-Tohamy et al., 2008). Omar et al, (2010) mentioned that, it was clear the great role of compost tea

(CT) and filtrate biogas slurry liquid (FLB) as two sources of foliar application of organic fertilization for Washington navel orange grown in a clay loamy soil, as they are indispensable for improvement of the nutritional status of the navel orange trees and production of maximum yield and quality of orange, as well as minimizing the cost of production and in turn increasing the income of orange orchard. So, it should be recommended the superiority of application of (FLB) and (CT), especially 100%, which gave the best results in yield and physical and chemical characteristics of navel orange fruits. A conventional agricultural spray application system consists of three main equipment components. First, the spray tank where agitation takes place to keep the liquid suspension thoroughly mixed. Because of the nature of a bio-pesticide suspension, the possibility of the organisms falling to the bottom of the spray tank may make mixing an even more important consideration than with conventional pesticides. Typically, a pump withdraws part of the fluid from the tank and then injects it back into the tank through high-velocity jets from nozzles creating turbulent mixing in the tank. During operation, the liquid suspension will be reticulated through the pump many times. The second equipment component is the pump (Sehsah, 2005) and (Sehsah and Belal, 2016)

OBJECTIVES

The objectives of the current research were to spray the compost extracts (compost tea) by using the different mechanical hydraulic sprayers. As well as evaluation of the different aerated compost tea (ACT1) and nun-aerated (ACT2) as provide organic fertilizer to apple trees. Utilization the crop residuals and animal wastes to produce the compost tea (ACT). Investigated the using of the yeast with the compost tea to improve and increase nutrient availability.

MATERIALS AND METHODS

The different techniques sprayers, conventional gun sprayer (Alcon Motori) and two different motorized backpack sprayers, an air assisted backpack sprayer Suzuki (2.13 kW) and Tiazh.Qinili Machinery Knapsack sprayer (0.7 kW) as shown in figure 1. Two different compost tea, the compost tea ACT1 and ACT2 were applied under laboratory

conditions. Microscope Traveler with a digital camera and software Image J V1.52 program was used to count the yeast cells before and after spray treatment conditions. ImageJ is a public domain Java image processing program inspired by the National Institutes of Health. It runs, either as an online applet or as a downloadable application, on any computer with a Java 1.52 or later virtual machine. It is multithreaded, so time-consuming operations such as image file reading can be performed in parallel with other operations. The ImageJ program can calculate the area, count cells and pixel value statistics of user-defined selections as shown in figure 2.

Procedures

The current research carried out under laboratory conditions of the Agricultural Engineering Department and Microbiology division, Faculty of Agriculture, Kafrelsheikh University, Egypt to evaluate the different techniques which used to spray the apple trees under Egyptian conditions. The three differences above mentioned spray techniques were prepared to spray the two compost tea (ACT) with and without adding of yeasts. The first trail for operating pressure was adjusted at 480 kPa and 180 kPa for conventional gun sprayer and Tiazh.Qinili Machinery Knapsack respectively. The Suzuki air assisted backpack sprayer was adjusted at the full position of the outlet throttle air fan and compared to the above mentioned two sprayers at their operating pressure. The second trail for operating pressure was adjusted at 390 kPa and 150 kPa for conventional gun sprayer and Tiazh.Qinili Machinery Knapsack respectively. As well as the Suzuki air assisted backpack sprayer was adjusted at half position of the outlet air and compared to the above setting of the operating pressure of conventional gun sprayer and Tiazh.Qinili Machinery Knapsack. The ١ gm of yeast/litter was added for both compost teas solution ACT1 and ACT2 as the marker of the microorganism in the compost tea. The samples from every treatment were collected in Petri dishes and stored to count the yeast cells after spray. The control samples were taken from the tanks of every sprayer (conventional gun sprayer Tiazh.Qinili Machinery Knapsack and Suzuki air assisted backpack sprayer).

Preparation of aerobic compost tea

Rice straw composts (ACT1) was made from rice straw Sakha 101 residues, cattle dung manure at Agricultural Botany Department, Faculty of Agriculture, Kafrelsheikh University, Egypt. Rice straw was shredded. Then all other materials were mixed and arranged in heaps at 2 m width x 1.5 m height x 5 m length, which were regularly turned and moistened with water (55–65%) for 70 days to ensure appropriate composting conditions (turned windrow system). The heaps were covered with plastic to reduce the moisture evaporation from the surface of the piles, consequently preventing the dynamics of the piles. Heaps were moistened when needed and weekly turned to ensure adequate aeration and high decomposition. The compost was inoculated with a starter from mesophilic and thermophilic lignolytic and cellulolytic microorganisms to accelerate the degradation rate (3 x107 colony-forming units [cfu]/g rice straw) (Belal and El- Mahrouk, 2010). Maturity of compost was shown when the temperature inside the heap decreased and was similar to air temperature around the heap, also decreasing the carbon/nitrogen (C/N) ratio of compost at the end of composting comparing with the raw materials. C/N ratio of rice straw compost at the beginning of composting process was 30:1 and it was 15.2 at the end of composting period. Heaps were inoculated at maturity stage with Trichoderma harzianum and plant growth promoting rhizobacteria (PGBR) (4 x 10^8 cfu/g mature compost). Compost tea was prepared by brewing compost and water at a ratio of 1:5 w/v (compost/water) with continuous aeration. Tap water was added to the brewing tank approximately 24 hours prior to use to allow virtualization of chlorine (Naidu et al., 2010). After that, compost tea was filtrated. The filtrated solution was diluted two times for foliar spraying. The compost tea ACT2 was prepared from different crop residues such as corn straw, crop residues from vegetables and without cattle dung manure. The above mentioned steps were used to obtain the ACT2. Physicochemical characteristics of compost tea are given in Table 1. Custom acquisition, analysis and processing plug-in can be developed using ImageJ's built in editor and Java compiler. User-written plug-in make it possible to solve almost any image processing or analysis problem. With the object outlined, the count cells was calculated by

selecting the measure option (selected from the analyze menu) (Sehsah and Belal, 2012). The damage percent of yeasts cell was calculated by using the following formula: Damage cell, %= (No. of cells in control sample- No. of viability cells)x100/ No. of cells in control sample .

Table 1: Physicochemical characteristics of soils (clay and sandy) compost

Parameter	Compost
pH	7.4
Electrical conductivity	1.8
% organic matter	17.5
Nitrogen (ppm)	311.4
Potassium (ppm)	9.8
Phosphates (ppm)	126.3
Cadmium (ppm)	0.3
Nickel (ppm)	0.83
Pb (ppm)	1.3
Manganese (ppm)	5.2
Copper (ppm)	3.5
Iron (ppm)	10.1
Seed germination test %	93
Total count of Bacteria	$3x10^8$
Total count of Fungi	$6x10^6$
Total count of actinomycetes	$3x10^7$
Phytopathogenic agents (Fungi, Bacteria and nematode)	0
Total E. coli form counts	0
Total Salmonella counts	0

Figure 1: The conventional gun Alcon sprayer and two knapsack motorized sprayers

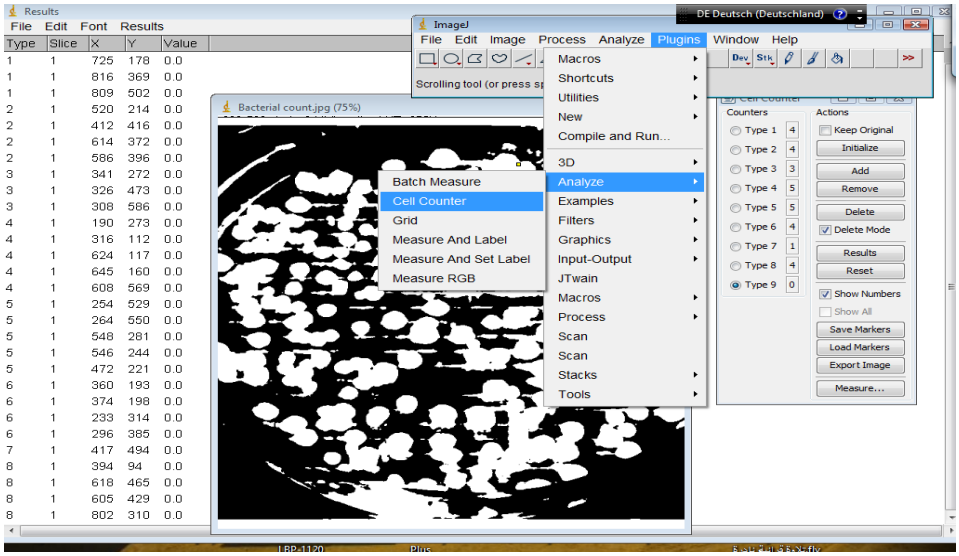

Figure 2: Indicate the imaging processing program Image J V.1.52 to count the yeast cell

RESULTS AND DISCUSSION

The result indicated that it could be able to use the compost tea as liquid organic fertilizer and the motorized conventional gun sprayer may produce good results compared to the different knapsack sprayer as shown in figure 3. Figure 4 indicates that the effect of the different techniques sprayer on the two different of compost tea solution ACT1and ACT2 with yeast at different operating pressure. The conventional gun sprayer gave the lowest values of the viability number yeast cell or highest values of extracted yeast cells compared to the control and both knapsack sprayers. This result may be due to the high operating pressure which damaged the yeast well cells. The viability numbers of yeast cells for ACT1 were 0.52 x 10^6/ ml, 2.60 x 10^6 / ml and 1.22 x 10^6 / ml for conventional sprayer, motorized an air assisted backpack sprayer Suzuki and Tiazh Qinili Machinery Knapsack sprayer respectively. The viability numbers of yeast cells for ACT2 were 0.63 x 10^6/ ml, 1.06 x 10^6 / ml and 0.82 x 10^6 / ml for conventional sprayer, motorized an air assisted backpack Suzuki sprayer and Tiazh Qinili Machinery Knapsack sprayer respectively. The increasing of the extracted yeast cells tends to increase the natural component contains many of the nutrient elements and

cytokininis, which is safe and non-pollutant. Figure 4 and 5 indicated that the effect of the increasing operating pressure for different techniques on the microorganism or yeast cells. The increasing of operating pressure tends to produce a highly damage of yeast cells under all techniques conditions. It means that, the extract of yeast or nutrient may be increasing at high operating pressure. The conventional gun sprayer gave a high value or low lives number of yeast cells compared to the motorized an air assisted backpack sprayer Suzuki and Tiazh Qinili Machinery Knapsack sprayer. The viability numbers of yeast cells for conventional gun sprayer in ACT1 compost tea were 0.76 x 10^6 / ml and 0.52 x 10^6 / ml at operating pressure 390 kPa and 480 kPa respectively. As well as, the viability numbers of yeast cells for conventional gun sprayer in ACT2 compost tea were 0.84 x 10^6 / ml and 0.76 x 10^6 / ml at operating pressure 390 kPa and 480 kPa respectively. The motorized an air assisted backpack Suzuki sprayer and Tiazh Qinili Machinery Knapsack sprayer gave the same trend compared to conventional gun sprayer. Also, it is noticed that, the air assisted backpack Suzuki sprayer at half and full open air position produced high values of viability yeast cells compared to the gun conventional sprayer and Tiazh Qinili Machinery Knapsack sprayer for both compost tea solution ACT1 and ACT2. The viability numbers of yeast cells for the air assisted backpack Suzuki sprayer were 2.3 x 10^6 / ml and 4.6 x 10^6 / ml for ACT1 and ACT2 compost tea at half open throttle air position respectively. The viability numbers of yeast cells for the air assisted backpack Suzuki sprayer were 2. 6 x 10^6 / ml and 1.0^6 x 10^6 / ml for ACT1 and ACT2 compost tea at full open throttle air position respectively. This result may be due to the air velocity which tends to shear the microorganisms. Figure 6 indicated the percentage of damage yeasts cell due to the effect of different techniques sprayer in the organic fertilizer ACT1 and ACT2 at first and second trail conditions. The conventional gun sprayer produced highly values of damage percentage compared to the T.Qinili sprayer and Suzuki sprayer. The percentage of damage yeasts cell in ACT1 were 97.25% and 96.08 % at operating pressure 480 kPa and 390 kPa respectively. The Suzuki sprayer produced the minimum percentage of damage yeasts cell in both trail conditions. The minimum percentage

damage cells value were 78.49 % and 75.94 % at trail 1 and trail 2 conditions in ACT2 respectively.

SUMMARY AND CONCLUSIONS

The result indicated that the conventional hydraulic sprayer (gun sprayer) gave the best result to apply the compost tea with low values of the number of microorganisms (yeast cells). The compost tea with yeast ACT1 gave the best result compared to the compost tea ACT2. The air assisted backpack Suzuki sprayer at half and full open air position produced a high value of viability yeast cells compared to the gun conventional sprayer and Tiazh Qinili Machinery Knapsack sprayer for both compost tea solution ACT1 and ACT2.The conventional gun sprayer produced highly values of damage percentage compared to the T.Qinili sprayer and Suzuki sprayer. The Suzuki sprayer produced the minimum percentage of damage yeasts cell in both trail conditions. Lower values of yeasts after treating main that there are a highest damage or crushed of yeast cells and the nutrition will be increasing.

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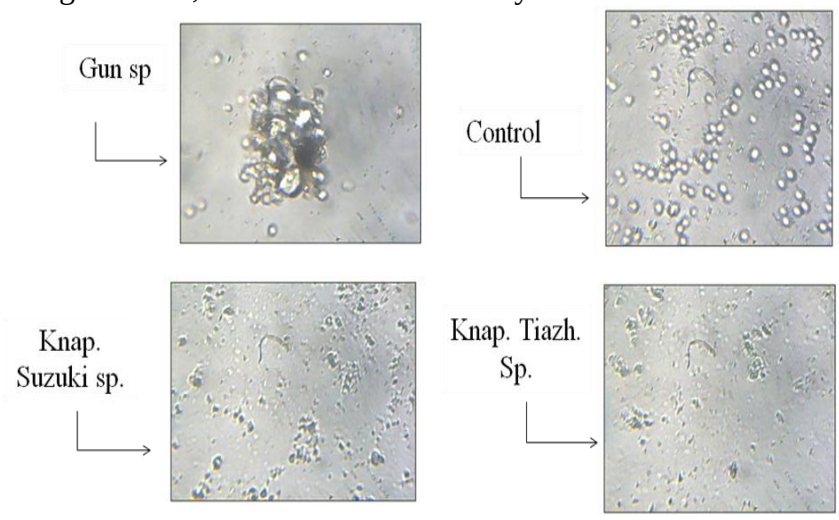

Figure 3: The microscopic photos indicate the effect of different techniques sprayer on the yeasts cells in compost tea.

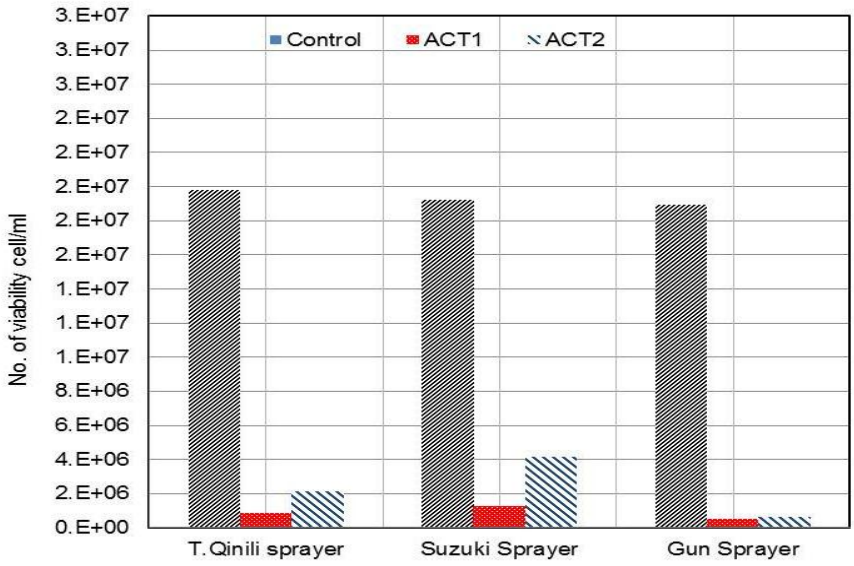

Figure 4: The effect of different techniques sprayer on the organic fertilizer under laboratory conditions at first trail operating pressure and full outlet air position of Suzuki sprayer.

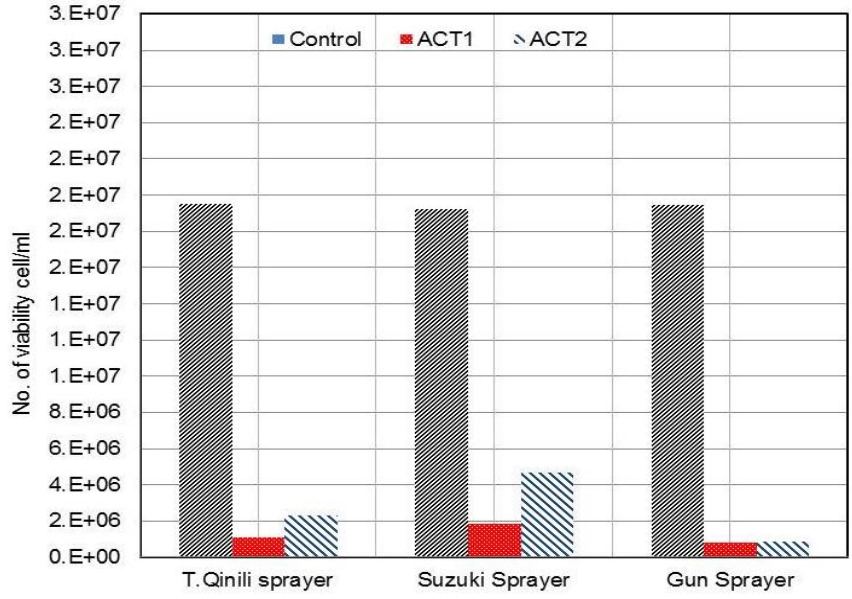

Figure 5: The effect of different techniques sprayer on the organic fertilizer under laboratory conditions at second trail operating pressure and half outlet air position of Suzuki sprayer.

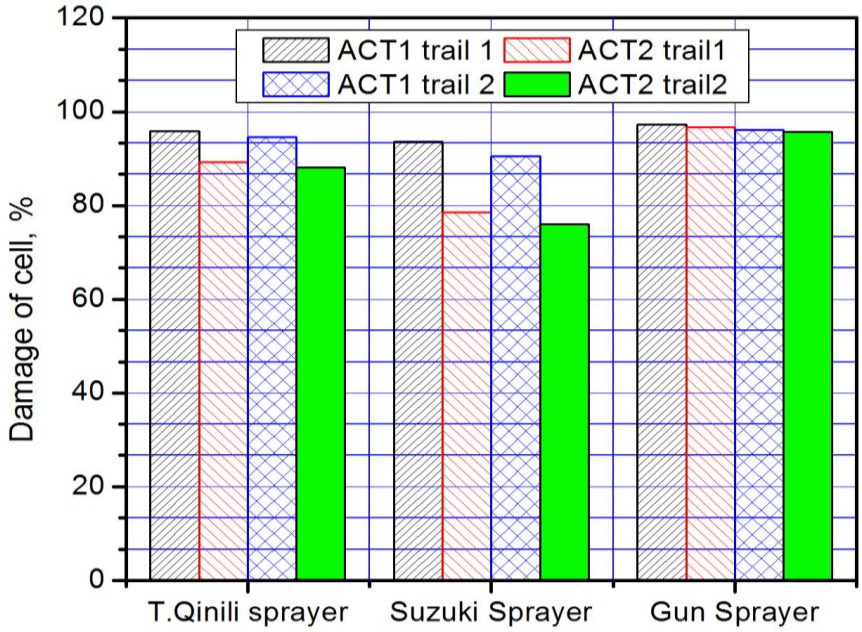

Figure 6: The percentage of damage yeasts cell due to the different techniques sprayer in the organic fertilizer ACT1 and ACT2 at first and second trail operating conditions

REFERENCES

Abou El-nour, E.A.A. (2002) Can supplemented potassium foliar feeding reduce the recommended soil potassium Pak. J. Biol. Sci. 5:259 – 262.

Amberger, A.A. (1991) Importance of micronutrients for crop production under semi-arid conditions of North Africa and Middle East. In Proceedings of the 4th Micronutrients Workshop, Amman, Jordan, 5–30. Cairo: NRC.

Belal, E.B., and M.E. El-Mahrouk (2010) Solid-state fermentation of rice straw residues for its use as growing medium in ornamental nurseries. Acta Astronaut. 67:1081–1089.

Chauhan, R.S., S.K. Maheshwari, and S.K. Gandhi (2000) Effect of nitrogen, phosphorus and farmyard manure levels on stem rot of

cauliflower caused by Rhizoctonia solani. Agric. Sci. Digest. 20:36–38.

El-Fouly, M. M., and A. A. El-Sayed (1997) Foliar fertilization; an environmentally friendly application of fertilizers. In Mortvedt, J. J. (Ed.) Proceedings of Dahlia Greidinger International Symposium on Fertilization and the Environment, Technian Haifa., pp. 346–358.

EL-Desuki, M. and Nadia, H.M. EL-Gereadly (2006) Response of pea plants to foliar application of yeast extract. J. Agric. Sci. Mansoura Univ., 31(10): 6667-6674.

El-Tohamy WA, El-Abagy HM, El-Greadly HM (2008) Studies on the effect of putrescine, yeast and vitamin C on growth, yield and physiological responses of eggplant (Solanum melongena L.) under sandy soil conditions. Aust J Basic Appl Sci. 2 (2): 296-300

Fawzy ZF, El-Shal ZS, Yunsheng L, Zhu O, Sawan OM (2012) Response of garlic (Allium Sativum L.) plants to foliar spraying of some bio-stimulants under sandy soil condition. Appl Sci Res. 8 (2): 770-776

Ghorbani, A., A. Koocheki, M. Jahan, and G. Aasadi. 2006. Effects of organic fertilizers and compost extracts on organic tomato production. Aspect. Appl. Biol. 79:113–116.

Goldstein, J. 2002. Compost suppresses disease in the lab and on the fields. BioCycle 39:62–64.

Khedr, Z.M.A. and S. Farid (2000) Response of naturally virus infected tomato plant to yeast extract and phosphoric acid application. Annals of Agric. Sci. Moshtohor, 38(2): 927-939.

Kowalczyk K, Zielony T (2008) Effect of aminoplant and asahi on yield and quality of lettuce grown on rockwool. Proc. Conf. of Biostimulators in Modern Agriculture, 7-8 Febuary, Warsaw, Poland

Larptansuphaphal T., and P. Jitumroochokchai. 2009. Effectiveness of bacteria and fungi inoculants in liquid organic fertilizer production. As. J. Food Ag-Ind. Special Issue: S169–S174.

Mahmoud, A. R., 2004. Response of potato to different level of organic nitrogen application and yeast spraying solution. Egypt. J. Appl. Sci., 19(11): 382-393.

Naidu, Y., S. Meon, J. Kadir, and Y. Siddiqu. (2010) Microbial starter for the enhancement of biological activity of compost tea INT. J. Agric. Biol. 12:51–56.

Omar, A.H. (2005) Fertilization of Thompson seedless grapevines with mineral and organic sources of nitrogen. J. Agric. Sci. Mansoura Univ. 30:7855–7862.

Omar A. Kh., E. B. Belal and A. A. El-Abd (2010) Effects of foliar application with compost tea and filtrate biogas slurry liquid on yield and fruit quality of Washington navel orange (Citrus sinenesis Osbeck) trees, Journal of the Air & Waste Management Association, 62:7, 767-772

Sehsah, E.M. and E.B.Belal (2012) Direct injection technique for bio-pesticide spray Misr J. Ag. Eng.,Vol. 29 No. (3): 875 – 892.

Sehsah. E.M. (2005) Application techniques for biological crop protection in orchards and vineyards" Ph.D thesis, Hohenheim university, verlag Grauer. Beuren. Stutgart. ISBN 3-86186-484-3, Institute of Agric.Eng.2005 Germany.

Sehsah, E.M and E.B.Belal (2016) 17th International Conference on Organic Fruit Growing Universität Hohenheim (Germany), February 15 to 17, 2016

Viana, F.M.P., R.F. Kobory, W. Bettiol, and S.C. Athayde. (2000) Control of damping-off in bean plant caused by Sclerotinia sclerotiorum by the incorporation of organic matter in the substrate. Summa Phytopathol. 26: 94–97.

Yeo, E., K. HawkBin, H. SangEun, L. JoonTak, R. JinChang, B. MyungOk, E.T. Yeo, H.B. Kwon, S.E. Han, J.T. Lee, J.C. Ryu and M.O. Byun (2000). Genetic engineering of drought resistant potato plants by introduction of the trehalose-6-phosphate synthase (TPSI) gene from Saccharomyces cerevisiae. Molecules and Cells., 10(3): 263-268.

الملخص العربى

تقييم تقنيات مختلفة لرش الكمبوست السائل لأشجار الفاكهة

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تهدف هذه الدراسة الى البحث فى أمكانية استخدام ثلاثة آلات رش مختلفة و منها موتور الرش التقليدى ذو البشبورى المسدس طراز Alcon Motori و الذى يستخدم فى مزارع التفاح تحت الظروف المصرية ، حيث أنه يحتاج الى ايدى عاملة كثيرة لتشغيلة و هذا يؤدى الى أرتفاع تكاليف عملية الرش و أيضا استهلاك الوقود حيث تم مقارنته بآلة رش ظهرية طراز backpack sprayer Suzuki بمحرك قدرة 2.13 ك.ووات و آلة رش ظهرية أخرى طراز Tiazh. Qinili Machinery Knapsack sprayer بمحرك قدرته ٠.٧ ك .ووات لرش منقوع الكمبوست مع الخميرة والكمبوست المستعمل كمغذى نباتى لمزارع التفاح ACT1تم أعداده بقسم النبات الزراعى فرع الميكروبيلوجى بكلية الزراعة جامعة كفرالشيخ حيث أستعمال الكمبوست السائل بعد معالجته بالخميرة كسائل للرش فى الآلات سابقة الذكر عند ضغط تشغيل ٤٨٠ ك.بسكال و ٣٩٠ ك.بسكال لموتورAlcon Motori و عند ضغط تشغيل ١٨٠ ك.بسكال و ١٥٠ ك.بسكال ك.بسكال للآلة الرش الظهرية طراز Tiazh. Qinili Machinery Knapsacبينما آلة الرش الظهرية Suzuki يابانية الصنع تم تشغيلها عند مستويين لدفع الهواء نصف وضع لخروج الهواء وعند وضع كامل لمروحة دفع الهواء بالآلة. طريقة أعداد الكمبوست المستعمل كمغذى نباتى حيث استعمل قش الأرز بعد تقطيعة مع المخلفات الحيوانية قى كومة أبعادها ٢ م x 5 م x1.5م تم ترطيبها بالماء و الحفاظ على محتوى رطوبى للكومة عند ٥٠ % لمدة ٧٠ يوم و كان ناتج عن عملية التخمر الهوائية (Composting) بعد التقليب كل اسبوعين هو الكمبوست و الذى تم نقعة فى الماء . و لزيادة المحتوى من النيتروجين المذاب لمنقوع الكمبوست أو الدبال و الذى ينتج عنه خروج العناصر الغذائية و الكائنات الحية الدقيقة الى المياه المضافه للكمبوست تم اضافة الخميرة للمنقوع الناتج بمعدل ١ جرام/ لتر. الكمبوست ACT2 استعمل مخلفات الذرة و مخلفات الخضر فقط مع اتباع نفس الخطوات السابقة فى اعداد ACT1 دون التهوية. أستعمل الميكروسكوب المزود بكاميرة PC و برنامج Image J 1.52 لعد خلايا الخميرة قبل و بعد الرش عند كل معاملة. العينة القياسية (control sample) تم عد الخميرة بها فى المحلول الناتج قبل الرش مباشرة.

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و قد أتضح من النتائج ما يلى: أعطى موتور الرش Alcon Motori أقل عدد لخلايا الخميرة الحية أو بمعنى آخر أعلى عدد لخلايا الخميرة الميته فى مستخلص الخميرة مقارنة بباقى الآلات المستعملة فى البحث حيث كان عدد الخميرة الحية فى المستخلص 0.52×10^6 / ملى لتر لموتور الرش مقارنة بالعدد 2.10×10^6 / ملى و 2.60×10^6 / ملى لكل من آلة الرش الظهرية طراز Tiazh. Qinili Machinery Knapsack sprayer و آلة الرش طراز backpack sprayer Suzuki على الترتيب. لسائل الرش ACT1. بينما بلغت عدد لخلايا الخميرة الحية أو أعلى عدد موت فى مستخلص الخميرة مقارنة بباقى الآلات المستعملة فى البحث حيث كان عدد الخميرة فى المستخلص 0.63×10^6 / ملى لتر لموتور الرش مقارنة بالعدد $1.0^6 \times 10^6$ / ملى و 0.82×10^6 / ملى لكل من آلة الرش الظهرية طراز Tiazh. Qinili Machinery Knapsack sprayer و آلة الرش طراز backpack sprayer Suzuki على الترتيب. لسائل الرش ACT2. كما وجد أيضا أن موتور الرش Alcon Motori قد اعطى أعلى نسبة للموت مقارنة بباقى الآلات حيث بلغت قيمتها ٩٧.٤ % و ٩٦.٨ % عند ضغط التشغيل ٤٨٠ ك.بسكال و ٣٩٠ ك.بسكال فى المحلول ACT1 على الترتيب . على الجانب الآخر فقد أعطت الرشاشة طراز backpack sprayer Suzuki أقل نسبة للموت للخلايا حيث بلغت قيمتها ٧٨.٤٩ % و ٧٥.٩٤ % عند تشغيلها عند نصف فتحة كاملة للهواء و نصف فتحة للهواء.