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EFFECT OF ADDING COMPOST TEA , SPRAYING SEAWEED EXTRACT AND STORAGE PERIOD ON THE STORAGE ABILITY OF CHINESE CABBAGE *BRASSICA RAPA SUBSP. CHINENSIS*

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Abstract
The experiment was conducted during the winter agricultural season 2021_2022 in a field belonging to the Agricultural Research Station of the College of Agriculture - University of Basra, with the aim of studying the effect of adding compost tea at levels of cow compost tea 5 kg. 20 l^{-1} , poultry compost tea 5 kg. 20 l^{-1} in addition to control distill water only, spraying seaweed extract(agazone) at levels of (0, 1.5, 3) mL. L^{-1} and the interaction between them in the storage ability of Chinese cabbage hybrid Mei Qing Choi. After harvesting Chinese cabbage packed in perforated polyethylene bags and stored in the refrigerator at a temperature of 4 ° C. during the period (5, 10, 15) days. The experiment was carried out as a factorial experiment according to the split-split plot design in a randomized complete plot design (R.C.B.D.). with three replicates, so that the experiment includes 54 experimental units. The results were analyzed by the analysis of variance and mean values were compared using the Revised Least Important Difference Test at 0.05 probability. Results showed the treatment of adding poultry compost tea 5 kg. 20 L^{-1} outperformed compared to the treatment of cow compost tea 5 kg. 20 L^{-1} and control treatment in reducing the percentage of decay , the percentage of weight loss , as the plants sprayed with seaweed extract with a concentration of 3 mL.L^{-1} significantly excelled as compared with the rest concentrations 0 and 1.5 mL. L^{-1} in reducing the percentage of weight loss, percentage of decay, total chlorophyll , carotene, vitamin C concentration and total soluble carbohydrates.

Key words: Chinese cabbage, compost tea, agazone, weight loss, total chlorophyll , carotene

INTRODUCTION

Chinese cabbage *Brassica rapa subsp. chinensis* which belongs to the Cruciferae family has been cultivated in Asia since the fifth century, and is eaten fresh or cooked or for making salads(Stephens, 1994). The plant is low in fat and cholesterol with a sweet taste and a juicy leaves, contain 18.2 gm of carbohydrates, 5.1 gm of proteins, 0.1 gm of fiber per 100 gm of fresh weight, calcium, iron, potassium, and a group of vitamins such as vitamin C and A (Eşiyok *et al*., 2011).

Organic fertilizers are important for increasing production in plants because they maintain soil fertility and improve soil properties, as they work to provide suitable environmental conditions for cultivated plants by increasing soil cohesion, especially sandy soils, preventing soil erosion and reducing its apparent density. Organic fertilizers resulting from plant and animal waste containing microscopic organisms in ideal conditions of humidity, temperature, ventilation and pH that work to decompose the organic matter in the soil resulting in non-humus compounds that are about 10-15%. Secondary metabolism (Taain *et al*.,2021).

The modern trend in agriculture is to move away from the use of chemical fertilizers, chemical growth regulators, and pesticides of different types and composition, due to their toxic effect on human and animal life. Therefore, researchers in agriculture tended to find safer materials such as the use of organic fertilizers and biostimulants, which have increased in demand in recent years and are now being applied,so they are widely used in sustainable agriculture as a safe alternatives for reduction the use of chemical fertilizers and other chemical compounds in agricultural production, so it is environmentally friendly and is an important step for preserving the integrity of the environment and community health, as it contributes to the production of clean food of excellent quality (Taain and salman,2018).

Seaweed has been used since ancient times as a fertilizer to improve soil properties and increase the growth and health of crops by providing essential nutrients by decomposing organic matter, improving soil texture and increasing water holding capacity (Hong *et al*., 2007). *Ascophyllum nodosum*, a brown seaweed belonging to the family Fucaceae, found in the northwestern coasts of Europe and the northeastern coasts of North America. It has long been used as an organic fertilizer for many crop due to its contents of macro and micronutrients (N, P, K, Mg, S, Ca, Mn, Cu, Fe, Zn) ,in addition to cytokinins, auxins, gibberellins, organic acids, sugars, amino acids and proteins. Studies showed that it has an effect on encouraging vegetative growth, increasing the yield ,improving the quality, and caused an increase in the vital activities in the plant without causing any toxicity or distortion of the plant treated with Taain and salman(2018). It is considered a material that is free of collateral damage to humans or animals, as it is allowed for use by the Environment Protection Agency (EPA).

The organization of the supply of Chinese cabbage in the local markets and the increase in the duration of its presentation in fresh condition and high quality of consumption requires the improvement of the storage ability of this crop as a leafy vegetable if the weakness of storage behaviour has been taken into account because of the high water content and thus infected with the microorganisms , especially fungi , in addition to lose weight ,so the storage considers an active method used to try to keep the crops fresh as long as possible.So, due to the lack studies related to using seaweed extract(agazone) and compost tea, in improving storage ability of Chinese cabbage hybrid Mei Qing Choi , the present study was conducted.

MATERIAL AND METHOD

The experiment was carried out during the 2017-2018 season in one of the greenhouses of the Agricultural Research Station , College of Agriculture ,Basrah University in order to study the effect of ground addition of compost tea at two levels cow compost tea 5 kg. 20 l^{-1} water and poultry compost tea 5 kg. 20 l^{-1} water in addition to control treatment which was distill water only and spraying seaweed extract(agazone) at the concentrations of (0, 1.5, 3) mL. L^{-1} in storage ability of Chinese cabbage hybrid Mei Qing Choi. All the processes using in the production of this crop were conducted,and the experiment included three times the addition of ground compost tea with a time interval of 10 days and spraying agaone three times with an interval of 15 days.

Plants were packed in perforated polyethylene bags (16 hole with a diameter of 5 mm per bag and weighed 4kg per bag), and then stored at the temperature of (4°C) for two weeks. The weight

loss and decay was calculated as a percentages, total soluble carbohydrates (mg / 100 g) determined by using the Phenol- Sulfuric acid Colorimetric Method Modification as described by Dubois *et al*. (1956) and vitamin C (mg / 100 g) determined according to A.O.A.C. (1992). and the results were corrected to 20 ºC . Vitamin C (mg / 100 g) determined according to A.O.A.C. (1992).

Experiment was carried out as factorial experiment consisting of three factors: ground addition of compost tea, spraying with agazone and storage period, using Complete Rondomize Design (CRD) with three replicates. The results were statistically analyzed using the statistical program Genstat. The mean values differences were compared by using the least significant difference (L.S.D) test at the probability level of 0.05(Al-Rawi and Khalf Allah , 1980).

RESULTS

1. Weight loss percentage.

The results shown in Table 1 showed that the study factors and their interactions had a significant effect on the weight loss percentage of the Mei Qing Choi hybrid stored at 4 °C, as the poultry compost tea recorded the lowest weight loss percentage of 0.488% compared to the cow compost tea treatment and the control treatment that recorded 1.163% and 2.417 %, respectively. The treatment of seaweed extract Agazone with concentration 3 $ml.l^{-1}$ recorded the lowest percentage weight loss amounting to 0.724%, while the concentration of 0 $ml.l^{-1}$ recorded the highest percentage, reached 2.275%. The storage period had a significant effect, as 5-day storage gave the lowest percentage of 0.767%, compared to the highest weight loss recorded by 15-day storage, which amounted to 1.858%.

The same table showed that the interaction between the study factors had a significant effect on the percentage of weight loss, as the lowest average was 0.198% for the treatment of poultry compost tea and agazone at a 3 mL. L^{-1} concentration, and the highest average was 4.138% for the control treatment and agazone at a concentration of 0 mL. L^{-1}, as the results showed that the interaction between poultry compost tea and storage for 5 days recorded the lowest weight loss percentage of 0.217%, compared to the highest weight loss percentage of 3.227% recorded by control treatment at a period of 15 days of storage. The interaction between agazone at the concentration of 3 mL. L^{-1} and storage for 5 days gave the lowest percentage of 0.296%, compared to the highest obtained by 0 mL. L^{-1} concentration of agazone and storage for 15 days, which reached 2.984%. The triple interaction between the factors of the study indicated that there were significant differences, as the treatment of the poultry compost tea , the extract of seaweed algae" agazone "with a concentration of 3 mL. L^{-1} and storage for 5 days recorded the lowest percentage of weight loss amounted to 0.084%, compared to the highest percentage recorded by the treatment of control , 0 $ml.l^{-1}$agazone concentration and storage for 15 days reached 5.357%.

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Table 1. Effect of compost tea, agazone, storage period and the interaction between them on the percentage weight loss of Chinese cabbage hybrid Mei Qing Choi stored at 4 °C

Compost tea	Agaone	Storage period(day)			Compost tea × Agazone
		5	10	15	
Control	0	2.706	4.352	5.357	4.138
	1.5	1.050	1.973	2.435	1.820
	3	0.554	1.441	1.888	1.294
Cow compost tea 5 kg. 20 l⁻¹water	0	1.238	1.831	2.332	1.800
	1.5	0.455	1.121	1.455	1.010
	3	0.248	0.712	1.076	0.679
Poultry compost tea 5 kg. 20 l⁻¹ water	0	0.415	0.982	1.265	0.887
	1.5	0.153	0.405	0.580	0.379
	3	0.084	0.171	0.339	0.198
					Mean values of Compost tea
Compost tea × Storage period	Control	1.437	2.589	3.227	2.417
	cow compost tea 5 kg. 20 l⁻¹water	0.647	1.221	1.621	1.163
	poultry compost tea 5 kg. 20 l⁻¹ water	0.217	0.519	0.728	0.488
					Mean values of agaone
Agazone × Storage period	0	1.453	2.388	2.984	2.275
	1.5	0.553	1.166	1.490	1.070
	3	0.296	0.775	1.101	0.724
Mean values of storage period		0.767	1.443	1.858	

RLSD0.05						
Compost tea	**Agazone**	**Storage period**	**Compost tea × Agazone**	**Compost tea × Storage period**	**Agazone × Storage period**	**Compost tea × Agazone× Storage period**
0.0666	0.0666	0.0666	0.1154	0.1154	0.1154	0.1999

2. Decay percentage.

The results presented in table 3 showed that the study factors and their interactions had a significant effect on the percentage of decay of the Mei Qing Choi hybrid stored at 4 °C. The treatment of poultry compost tea gave the lowest percentage of decay reached 0.027%, whereas the highest percentage was recorded by control treatment amounted to 1.410% .The treatment of agazone with a concentration of 3 mL. L^{-1} recorded the lowest percentage of decay amounted to 0.148%, while the concentration of 0 mL. L^{-1} recorded the highest percentage amounted to 1.410%. Storage of hybrid for a period of 5 days, gave the lowest percentage of decay amounted to 0.221%, compared to the highest percentage recorded in the storage for a period of 15 days amounted to 0.930%.

In regard to binary interactions, there were significant differences between factorial treatments, as the treatment of poultry compost tea and agazone extract with a concentrations of 1.5 ml.l^{-1} and 3 ml.l^{-1} did not record any decay, while the highest percentage recorded by the control treatment and agazone extract at a concentration of 0 mL. L^{-1}.The interaction between poultry compost tea and storage period for 5 days did not record decay, compared to the highest percentage of 2.132% recorded by control treatment within 15 days of storage. The interaction between agazone extract 3 mL. L^{-1} and storage for 5 days did not record decay, while the 0 mL. L^{-1} concentration and storage for 15 days recorded the highest percentage of decay, reached 1.889%.

Regard to the triple interaction , the treatment of poultry compost tea , 3 mL. L^{-1} agazone and storage for 5 days, did not record any decay, compared to the highest percentage of 4.200% recorded in the control treatment , 0 mL. L^{-1} agazone and storage for 15 days.

Table 2. Effect of compost tea, agazone, storage period and the interaction between them on the decay percentage of Chinese cabbage hybrid Mei Qing Choi stored at 4 °C

Compost tea	**Agaone**	**Storage period(day)**			**Compost tea × Agazone**
		5	**10**	**15**	
Control	**0**	1.684	3.194	4.200	3.026

	1.5	0.048	0.945	1.356	0.783
	3	0.000	0.422	0.840	0.420
Cow compost tea 5 kg. 20 l⁻¹water	**0**	0.260	0.821	1.222	0.768
	1.5	0.000	0.491	0.442	0.311
	3	0.000	0.000	0.069	0.023
Poultry compost tea 5 kg. 20 l⁻¹ water	**0**	0.000	0.000	0.245	0.082
	1.5	0.000	0.000	0.000	0.000
	3	0.000	0.000	0.000	0.000
					Mean values of Compost tea
Compost tea × Storage period	**Control**	0.577	1.520	2.132	1.410
	cow compost tea 5 kg. 20 l⁻¹water	0.087	0.437	0.578	0.367
	poultry compost tea 5 kg. 20 l⁻¹ water	0.000	0.000	0.082	0.027
					Mean values of agaone
Agazone × Storage period	0	0.648	1.338	1.889	1.292
	1.5	0.016	0.479	0.599	0.365
	3	0.000	0.141	0.303	0.148
Mean values of storage period		0.221	0.653	0.930	

RLSD0.05						
Compost tea	**Agazone**	**Storage period**	**Compost tea × Agazone**	**Compost tea × Storage period**	**Agazone × Storage period**	**Compost tea × Agazone× Storage period**
0.0909	0.0909	0.0909	0.1574	0.1574	0.1574	0.2727

3.Total soluble carbohydrates mg.100g^{-1}

The results of table 9 showed that the poultry compost tea treatment was significantly superior with the highest concentration of 124.7 mg.100g^{-1} in the total soluble carbohydrate concentration of the hybrid Mei Qing Choi over the two cow compost tea and the control treatments, which amounted to 101.6 and 77.7 mg.100g^{-1} respectively. The treatment of 3 mL. L^{-1} agaone with the highest concentration of 157.3 mg.100g^{-1} was superior to the two treatments of 1.5 mL. L^{-1} and 0 mL. L^{-1}, which amounted to (95.3 and 51.4) mg.100g^{-1} respectively.The storage period had no significant effect on total soluble carbohydrate .

As for the interaction between the compost tea and agazone , The poultry compost tea treatment and the seaweed extract agazone at the concentration of 3 mL. L^{-1} gave the highest value of total soluble carbohydrates reached 182.2 mg. 100g^{-1} ,while the lowest value was in control treatment and 0 mL. L^{-1} agazone which reached 32.4 mg. 100g^{-1}. As for the interaction between the compost tea and storage period, the highest value of total soluble carbohydrates recorded by the poultry compost tea treatment and storage for 5 days which was 125.3 mg. 100g^{-1},while the lowest value recorded by control treatment and storage for 15 days which was 77.0 mg. 100g^{-1} . As for the interaction between agazone and storage period, the highest value of total soluble carbohydrates recorded by 3 mL. L^{-1} agazone and storage for 5 days ,reached157.8 mg. 100g^{-1}, while the 0 mL. L^{-1} agazone and a storage period of 15 days gave the lowest value amounted to 50.7 mg. 100g^{-1}.

With regard to the triple interaction, , as the treatment of poultry compost tea , 3 mL. L^{-1} agazone and storage for 5 days gave the highest value of 182.7 mg. 100 g^{-1} total soluble carbohydrates compared to the lowest one recorded by the control treatment , 0 mL. L^{-1} agazone and stored for 15 days, t reached 31.7 mg. 100 g^{-1}.

Table 3. Effect of compost tea, agazone, storage period and the interaction between them on the percentage of total soluble carbohydrates mg.100g^{-1} of Chinese cabbage hybrid Mei Qing Choi stored at 4 °C.

Compost tea	Agaone	Storage period(day)			Compost tea × Agazone
		5	10	15	
Control	0	32.9	32.5	31.7	32.4
	1.5	82.8	82.6	81.6	82.3
	3	118.8	118.4	117.6	118.3
Cow compost tea 5 kg. 20 l^{-1}water	0	49.0	48.6	47.8	48.5
	1.5	85.3	84.9	84.1	84.8
	3	171.9	171.5	170.7	171.4
	0	73.9	73.5	72.7	73.3

Poultry compost tea 5 kg. 20 l⁻¹ water	**1.5**	**119.2**	**118.8**	**118.0**	**118.7**
	3	**182.7**	**182.3**	**181.5**	**182.2**
					Mean values of Compost tea
Compost tea × Storage period	**Control**	**78.2**	**77.8**	**77.0**	**77.7**
	cow compost tea 5 kg. 20 l⁻¹water	**102.1**	**101.7**	**100.9**	**101.6**
	poultry compost tea 5 kg. 20 l⁻¹ water	**125.3**	**124.9**	**124.1**	**124.7**
					Mean values of agaone
Agazone × Storage period	0	**51.9**	**51.5**	**50.7**	**51.4**
	1.5	**95.8**	**95.5**	**94.6**	**95.3**
	3	**157.8**	**157.4**	**156.6**	**157.3**
Mean values of storage period		**101.9**	**101.5**	**100.6**	

RLSD0.05						
Compost tea	**Agazone**	**Storage period**	**Compost tea × Agazone**	**Compost tea × Storage period**	**Agazone × Storage period**	**Compost tea × Agazone× Storage period**
6.09	**6.09**	**N.S.**	**10.55**	**10.55**	**10.55**	**18.26**

4.vitamin C mg.100g⁻¹

The results of the statistical analysis in table 11 showed that the poultry compost tea treatment was significantly superior to the highest average of 64.19 mg. 100g⁻¹ over the two cow compost tea treatments and the control, amounted to (57.45 and 42.03) mg.100g⁻¹, respectively. The treatment of 3 ml.l⁻¹ agazone with the highest average of 67.69 mg.100g⁻¹ was superior to the two treatments of agazone with concentrations 1.5 and 0 mL. L⁻¹, which amounted to 59.52 and 36.45 mg. 100g⁻¹ respectively, the 5-day storage treatment excelled with the highest average of vitamin C amounted to 57.97 mg.100 g⁻¹ compared to the lowest mean for the 15-day storage treatment amounted to

51.23 mg.100 g^{-1}.

The interaction between poultry compost tea and agazone at a concentration of 3 $ml.l^{-1}$ recorded the highest value of vitamin C amounted to 77.02 $mg.100g^{-1}$,while the lowest value was 24.53 $mg.100g^{-1}$ recorded by the concentration of 0 mL. L^{-1}. the interaction of poultry compost tea and storage for 5 days gave the highest value of 67.69 mg. $100g^{-1}$, whereas the control treatment and storage for 15 days was 38.53 mg. $100g^{-1}$. The treatment of 3 mL. L^{-1} agazone and storage for 5 days recorded the highest value of 71.18 mg. $100g^{-1}$, while the agazone at the concentration of 0 mL. L^{-1} and a storage period of 15 days recorded the lowest mean of vitamin C reached 38.53 mg. $100g^{-1}$.

The triple interaction of poultry compost tea , 3 mL. L^{-1} agazone and storage for 5 days gave the highest value of vitamin C amounted to 80.52 $mg.100g^{-1}$, while the lowest value was21.03 mg. $100g^{-1}$ recorded by the control treatment , 0 mL. L^{-1} agazone and storage for 15 days.

Table 4. Effect of compost tea, agazone, storage period and the interaction between them on the percentage of vitamin C $mg.100g^{-1}$ of Chinese cabbage hybrid Mei Qing Choi stored at 4 °C.

Compost tea	Agaone	Storage period(day)			Compost tea × Agazone
		5	10	15	
Control	0	28.03	24.52	21.03	24.53
	1.5	49.03	45.52	42.03	45.53
	3	59.52	56.03	52.52	56.02
Cow compost tea 5 kg. 20 l^{-1}water	0	42.02	38.52	37.37	39.30
	1.5	66.52	63.03	59.52	63.02
	3	73.52	70.03	66.52	70.02
Poultry compost tea 5 kg. 20 l^{-1} water	0	49.03	45.52	42.03	45.53
	1.5	73.52	70.03	66.52	70.02
	3	80.52	77.03	73.52	77.02
					Mean values of Compost tea
Compost tea × Storage period	Control	45.53	42.02	38.53	42.03
	cow compost tea 5 kg. 20 l^{-1}water	60.68	57.19	54.47	57.45

	poultry compost tea 5 kg. 20 l^{-1} water	**67.69**	**64.19**	**60.69**	**64.19**
					Mean values of agaone
Agazone × Storage period	0	**39.69**	**36.18**	**33.48**	**36.45**
	1.5	**63.02**	**59.53**	**56.02**	**59.52**
	3	**71.18**	**67.70**	**64.18**	**67.69**
Mean values of storage period					

RLSD0.05						
Compost tea	**Agazone**	**Storage period**	**Compost tea × Agazone**	**Compost tea × Storage period**	**Agazone × Storage period**	**Compost tea × Agazone× Storage period**
2.025	**2.025**	**2.025**	**3.508**	**3.508**	**3.508**	**6.076**

DISCUSSION

The seaweed extracts contain cytokinins and auxins and a high percentage of salicylic acid so, they increase the resistance of plants to physiological disorders and diseases caused by microorganisms and prolong the storage life of crops (Dell, 2013).

It is noted from the previous results that there is a significant effect of the seaweed extract of *Ascophyllum nodosum* in improving the storage behavior of the Chinese cabbage , which is maybe due to the increment of the activity of antioxidants, that work to protect the cell membrane and inhibit the action of enzymes responsible for the oxidation process such as peroxidase and polyphenol oxidase leading to improving the storage ability of the crops.In addition that the extract contains gibberellins and cytokinins, which work to increase the area of the leaves and delay their aging and thus increase the efficiency of photosynthesis, which provides the largest amount of processed food in the leaves and increases their content of components chemicals, thus improving their qualitative indicators and improving their storage behavior. (Augusto *et al*., 2016 ; Frioni *et al*., 2018; Taain and Salman,2018).

It is clear from the results that spraying agazone, especially the concentration of 3 $mL.L^{-1}$, reduced the percentage of weight loss for the Chinese cabbage compared to the control treatment. This may be due to the fact that the extract contains auxins, cytokinins, and gibberellins, which have a role in maintaining the permeability of cell membranes by controlling the movement of substances across membranes, in addition to reduce the respiratory rate. The results of the study agree with

Taain and Salman (2018) that the treatment with agazone, reduced the percentage of weight loss for eggplant fruits stored at 13 ° C for a period of two weeks. The results also indicated a relative increment in weight loss with an increase in the storage period, that due to water evaporation from plant leaves by the process of transpiration as the storage period progresses, which leads to a loss of water content with the continuation of the storage period, as well as the consumption of stored food as a result of the respiration process, and this result is identical to what was indicated by Taain *et al*., (2017) that the rate of weight loss for tomato fruits increase with the increment of storage period.

The treatment with organic fertilizers (tea compost) reduced the percentage of weight loss compared to the control treatment. The reason for this is that the organic fertilizers provide the plant with the nutrients necessary for its proper growth and thus improve the growth indicators and the chemical compounds in the plant, as the improvement of the chemical, physical and biological properties of the treated soil, which leads to an increase in the availability of macro and micro nutrients and their ability to exchange ions and increase the activity of microorganisms which, in turn, works to release phosphorus from organic compounds, which has a significant impact on reducing the percentage of weight loss during storage..In addition that, the containment of these fertilizers on vital compounds increases the photosynthesis process of the plant, which stimulates the secondary metabolism of the plant, which leads to an increase in phenolic compounds and the ability of oxidants, and thus increases the storage ability. The current study proved that treatment with poultry compost and algae extract had a significant effect in reducing the loss of vitamin C content. The results indicate that the amount of vitamin C began to decrease with the elongation of storage periods, and that the decrease in the concentration of vitamin C may be due to the oxidation and the transformation into dehydro-ascorbic acid, by the action of the enzymes oxidase and ascorbase .The vitamin C content of the plant is also affected by some factors such as storage conditions such as temperature and elongation of storage period (Taain *et al*., 2014).

These results are consistent with the findings of Fan *et al*. (2013) that the treatment of spinach with *Ascophyllum nodosum* extract had a significant effect on reducing post-harvest losses, which attributed to reduce the production of lipid peroxide and increasing the synthesis of phenolic compounds, which in turn enhance the antifungal and antibacterial activity. These marine extracts promote the accumulation of enzymes betaine aldehyde dehydrogenase (BADH) and choline mono-oxygenase, which contribute to the reduction of the biosynthesis pathway of the ammonium glycine betaine compound responsible for plant protection from environmental stresses (Fan *et al*., 2013; Sakamoto *et al*., 2002). As the results of studies have shown that the seaweed extract mentioned above contains ammonium compounds (glycine betaine), δ-aminovaleric acid betaine, γ-aminobutyric acid betaine and laminine . (MacKinnon *et al*., 2010).

Conclusion: In conclusion, the results showed the role of spraying agazone and adding compost tea in improving storage ability of Chinese cabbage hybrid Mei Qing Choi stored at 4°C for two weeks. Obtained results indicated that the treatment of adding poultry compost tea 5 kg. 20 L^{-1} outperformed compared to the treatment of cow compost tea 5 kg. 20 L^{-1} and control treatment in reducing the percentage of decay , the percentage of weight loss , as the plants sprayed with

agazone at the concentration of 3 mL.L^{-1} significantly excelled as compared with the rest concentrations 0 and 1.5 mL. L^{-1} in reducing the percentage of weight loss, percentage of decay, total chlorophyll , carotene, vitamin C concentration and total soluble carbohydrates.

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