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Research Article

An Accumulation of Heavy Metals on the Planting Pumpkins After COVID-19 in Ho Chi Minh City

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Abstract

Vegetables are foods everyone, very nutritious and necessary for the men in life, they can't be insufficient, especially, vegetables cure the diseases, too. Here, we want to speak to the pumpkins. This is a kind agricultural produce which are planted generally in Vietnam country, the flowers, leaves, buds and fruits are used in order to eat, too. Pumpkins have the vitamins A, vitamins B and another nutrient, delicious. Fruits of pumpkin are not only eaten but also cure diseases such as: Brighten eyes, headache, tonic, help a strong memory; and grains can cure the worms. Pumpkins – vegetables, everyone provides the from the suburbs district such as: Binh Chanh, Hoc Mon, Cu Chi, Go Vap … and the provinces such as: Long An, Tien Giang, Tay Ninh… very much. In a season of epidemic Covid-19 ago, at the year 2021, the population of Ho Chi Minh City have many, many hard works because they are an insulation, the market assembles, it is that the autos do not run, the population of many provinces do not can transmit to the city, total works hold back many activities are stopped, the foods are rare, vegetables do not remain because they are destroyed, especially, there are only the kinds of Autum Squash, the gourd family, which the pumpkins they have money nutrient to eat, can to get many days, they do not destroy or they are destroyed rarely, everyone can put them many days in the house, the population likes eat the pumpkins, these are reasonable foods for the pours. In the report, we present food to plant, observe, analyze and study about heavy metals, insects, epidemics on the pumpkin in order to sure the health and give the nutrient for the persons.

Keywords

Vegetables, Heavy Metals, Nutrients, Pumpkins, Persons

1. Introduction

Pumpkins had a source from Middle of American, everyone planted all of year and a good Plantation from the South to North of Vietnam, pumpkins having [1, 2]:

1) General name: Bí đỏ, bí rợ.
2) Scientific: Cucurbita pepo L.
3) Foreign name: Pumpkin, Autumn Squash.
4) Family: Cucurbitaceae [12].

Formerly to now, the pumpkins were known and used for the riches or poor persons by a lot of vitamin such as: vitamin A, in the fruits had from 85 to 91% of water; 0,8 – 2g of protein; 0,1 – 0,5g of lipid; 3,3 – 11g glucose; an energy was from 85 to 170kcalo/100g. Besides, the leaves and the flowers were eaten because everyone boiled vegetables or vegetable soup [8, 9, 14].

By Covid – 19, the last time, 2021 it was rare vegetables in the Ho Chi Minh City, stagnated or vegetables did not

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transfer to the city, to the downtown, here that was not appeared vegetables while the rounding area had more and more of vegetables. In the long time, except pumpkins, everyone kept them only because they did not destroy. The other authors did not take care about this issue. Thus, we must study to plant in order to save the health for men [5-7].

2. Materials and Methods

2.1. Materials

1) Seeds of pumpkins were purchased from Hoa Sen Company.
2) The experiment was implemented in Dong Thanh village, Hoc Mon district, Ho Chi Minh City, of year 2022.
3) Vegetable samples were collected from vegetable growing households surrounding areas

2.2. Methods

Pumpkins were planted by using only organic fertilizers, such as: soil herbs, animal fertilizer, powder lime, ash of husk, biological fertilizer.

Plantation (Summary)

1) Current/events: everyone sow seeds since October, September of last year to January of new year.
2) Everyone makes herbs, soil, manures and plans the pumpkins [11, 17].
3) Everyone waters, he manures (it must have from 50 – 60% of humidity for garden [3]).
4) Everyone cuts tops, he cuts branches, trims the male flowers of pumpkins [4].
5) Female flowers were received pollens with a completion.
6) At last: harvesting and everyone keeps the races of pumpkin. Pumpkins are nutritiuos, we must plant and eat them very much [15].

3. Results and Dicussion

1) Model of water

Table 1. *Result analyzed of water sample.*

N^0	Parameters	Concentrations	Methods	Limitation values *
1	pH	5.35	Standard of VN 6442 - 2000	6.5 – 8.5
2	Color (Pt/10)	10	Standard of VN 6158 -1996	1.0
3	Degree of dirty (NT)	8	Standard of VN 6184 - 1996	2.0
4	$N\text{-}NH_4$ (mg/l)	0.3	Standard of VN 5988 - 1995	0.3
5	$N\text{-}NO_2^-$ (mg/l)	0	Standard of VN 6178- 1996	0.05
6	$N\text{-}NO_3^-$ (mg/l)	0.3	Standard of VN 6180 – 1996	0.05
7	Cl^- (mg/l)	88.8	Standard of VN 6194 – 1996	250
8	Ca^{2+} (mg/l)	24	Standard of VN 6224 – 1996	4.0 – 6.0
9	Mg^{2+} (mg/l)	15.4	Standard of VN 6224 – 1996	2.0 – 3.0
10	SO_4^{2-}	51.01	Standard of VN 6200 – 1996	≤ 0.5
11	PO_4^{3-}	0.6	Standard of VN 6178 – 1996	≤ 0.1
12	Coliform (MPN/100ml)	2×10^3	Standard of VN 4882 – 2001	≤ 1000
13	E. Coli (MPN/100ml)	<0.02	Standard of VN 6846 – 2001	20

Note: *According to Vietnam standard/ National technical regulation on the limits of heavy metals contamination in food (Vietnamese Technical Regulation 8 -2:2011/ Medicinal Ministry) [16]

In Table 1: pH was low; Color and Dirty: high; NO_2^- no appear; NH_4: was average; NO_3^- high; Cl^-: low; Ca^{2+} and Mg^{2+}: high; SO_4^{2-} and PO_4^{3-} were high; Coliform: very high; E. Coli: low.

2) Model of soil

Table 2. Result analyzed of soil samples.

N^0	Parameters		Concentrations	Methods	Limitation values *
1	pH (H_2O) 1:5		4.43	Standard of VN 5979:1995	6.5 – 8.5
2	pH (KCl) 1:5		3.99		6.0
3	EC (µS/cm) 1:5		106.3	Standard of VN 6650:2000	10 - 20
4	Ca^{2+} (mg/100g)		1.89	AOAC 2000	4.0 – 6.0
5	Mg^{2+} (mg/100g)		0.37		2.0 – 3.0
6	N total (%)		0.159	Standard of VN 6445-2000	0.1 – 0.15
7	SO_4^{2-} (mg/100g)		14.71	Standard of VN 6456-2000	10 – 2.0
8	P_2O_5 (%)		0.41	AOAC 2000	0.06 – 0.08
9	K_2O (%)		0.016	AOAC 2000	0.3 – 1.5
10	Emery	Sand (%)	4	AOAC 2000	-
		Clay (%)	70		
		Flesh (%)	26		

Note: *According to Vietnam standard/ National technical regulation on the limits of heavy metals contamination in food (Vietnamese Technical Regulation 8 -2:2011/ Medicinal Ministry) [16].

In Table 2: pH: low; Ca^{2+} and Mg^{2+}: low; N total: average; $SO_4^{2-:}$ high; P_2O_5: high; K_2O: low. The soil was poor and sour, we planted difficultly, therefore, we had to add powder lime. ash of husk…

3) Model of round pumpkin

Table 3. Result analyzed of round pumpkins.

N^0	Parameters	Concentrations		Methods	Limitation values *
		Chemical fertilizer	Organic fertilizer		
(1)	(2)	(3)	(4)	(5)	(6)
1	Wet degree (%)	90.17	91.27	AOAC & Standard 2000	80 - 90
2	NO_3^- (mg/kg)	289.18	210.2	AOAC & Standard 2000	≤ 400
3	Protein (%)	0.96	0.98	AOAC 987.04-1997	0.5
4	Lipid (%)	0.28	0.56	AOAC 871.01-1997	0.5
5	Glucose total (%)	13.02	14.12	AOAC 974.06-1990	1.0
6	Substance of filament (%)	0.90	0.96	AOAC 973.18-1990	-
7	As (µg/kg)	4.48	-	ACIAR-AAS 001-2007	0.015
8	Cu (mg/kg)	3.50	-	ACIAR-AAS 007-2007	0.1
9	Pb (mg/kg)	6.70	-	ACIAR-AAS 015-2007	0.02
10	Zn (mg/kg)	53.51	1.98	ACIAR-AAS 019-2007	0.5
11	Cd (mg/kg)	1.41	-	ACIAR-AAS 004-2007	0.015

Note: *According to Vietnam standard/ National technical regulation on the limits of heavy metals contamination in food (Vietnamese Technical Regulation 8 -2:2011/ Medicinal Ministry) [16].

In Table 2: Wet degree: high; NO_3^{-} low; protein: high; glucose: high; heavy metals such as: As, Cu, Pb, Zn, Cd at a column (3) were higher at column (4); that means at the column (3): we bought fertilizer in the magazine; at column (4): we made with wild herbs * or +++ (see APPENDIX), algae, biological fertilizer…

4) Model of long pumpkins

Table 4. *Result analyzed of long pumpkins.*

N^0	Parameters	Concentrations		Methods	Limitation values *
		Chemical fertilizer	Organic fertilizer		
(1)	(2)	(3)	(4)	(5)	(6)
1	Wet degree (%)	92.14	92.18	AOAC & Standard 2000	80 – 90
2	NO_3^- (mg/kg)	238.35	188.70	AOAC & Standard 2000	≤ 400
3	Protein (%)	0.45	0.51	AOAC 987.04-1997	0.5
4	Lipid (%)	0.23	0.29	AOAC 871.01-1997	0,5
5	Glucose total (%)	12.49	13.12	AOAC 974.06-1990	1.0
6	Substance of dirty (%)	0.86	0.98	AOAC 973.18-1990	-
7	As (µg/kg)	0.21	0.01	ACIAR-AAS 001-2007	0.015
8	Cu (mg/kg)	0.58	0.02	ACIAR-AAS 007-2007	0.1
9	Pb (mg/kg)	0.97	0.01	ACIAR-AAS 015-2007	0.02
10	Zn (mg/kg)	78.65	0.05	ACIAR-AAS 019-2007	0.5
11	Cd (mg/kg)	0.56	-	ACIAR-AAS 004-2007	0.015

Note: *According to Vietnam standard/ National technical regulation on the limits of heavy metals contamination in food (Vietnamese Technical Regulation 8 -2:2011/ Medicinal Ministry) [16].

In Table 4: It is similar in Table 3, that means at the column (3), fertilizer was bought in the magazine having chemicals, therefore, heavy metals were higher than column (4): not chemicals, we had a choice of wild herbs biological herbs…

4. Conclusion

At the water, soil samples that we analyzed were poor, sour; in the plantation if we buy the chemical fertilizers, it is certain that heavy metals will higher; here we had the organic fertilizer; a choice of wild herbs, we had a good result, heavy metals were little or no appear [10].

Abbreviations

pH	Potential of Hydrogen
N	Nitrogen
P_2O_5	Phosphor pentoxide
K_2O	Kali oxide
Cl	Clor
Fe	Ferrum, Iron
Al	Aluminum.
Ca	Calcium
Mg	Magnesium
SO_4^{2-}	Sulfate
PO_4^{3-}	Phosphate
N	Nitrogen
NO_2	Nitrite
NO_3	Nitrate
NH_4	Ammonium
Cu	Copper
Pb	Lead
Cd	Cadmium
As	Arsenic
Zn	Zinc

Author Contributions

An Nguyen Thi Ngoc is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

We declare no conflicts of interest.

Appendix

Table 5. Wild herbs [13].

N^0	Quantity	Vietnamese names	Scientific names	Families
1	++	Ô rô	Acanthus ebracteus Vahl	Acanthaceae
2	++	Trái nổ	Ruella tuberosa L	Acanthaceae
3	+	Cỏ sướt	Achyranthes aspera L.	Acanthaceae
4	+	Nở ngày đất	Gomphrena celosioides Mart	Acanthaceae
5	++	Từ cô thon	Sagittaria sagittaefolia L	Alismaceae
6	++	Dền gai	Amaranthus spinosus L	Amaranthaceae
7	+	Mướp xác vàng	Cerbera odollarn Gaertn	Apocynaceae
8	++	Lòng mức lông	Wrightia pubescens R.Br subsp lanati (Bl) Ngân	Apocynaceae
9	++	Môn nước	Colocasia esculenta (L) Schott	Araceae
10	++	Bèo cái	Pistia stratiotes L	Lemnaceae
11	+	Cỏ cứt heo	Ageratum conyzoides L	Asteraceae
12	+	Cỏ mực	Eclipta prostrata L	Asteraceae
13	+	Chân voi nhám	Elephantepus scaber L	Asteraceae
14	+	Cỏ chua lè	Emilia sonchifolia (L) DC	Asteraceae
15	*	Cỏ hôi	Eupatorium odoratum L	Asteraceae
16	++	Lức	Pluchea indica Lees	Asteraceae
17	++	Cúc hoang	Tridax procumbens L	Asteraceae
18	+	Bèo dâu	Azolla pinnata BR	Azollaceae
19	+	Vòi voi	Heliotropium indicum L	Boraginaceae
20	++	Màng màng tím	Cleome viscosa L	Capparaceae
21	+	Đầu riều, trai Ấn	Commelina bengalensis L	Commelinaceae
22	++	Trai thường	C. communis L	Commelinaceae
23	++	Bìm long	Ipomaea eriocarpa R. Br	Convolvulaceae
24	++	Bìm 3 thùy	I. triloba L	Convolvulaceae
25	++	Bìm vàng	Jacquemontia paniculata (Burm) Hall. F	Convolvulaceae
26	++	Bìm trắng	Merremia hederacea (Burm. f) Hall.F	Convolvulaceae
27	++	Cứt quạ	Gymnopetalum cochinchinensis (L) Kurz	Cucurbitaceae
28	++	Lác nước	Cyperus malaccensis Lamk	Cyperaceae
29	+	Cỏ cú	C. rotundus L	Cyperaceae
30	+	Cỏ chác	Fimbristylis miliacea (L) Vahl	Cyperaceae
31	+	Tai tượng Ấn	Acalypha indica L	Euphorbiaceae

N^0	Quantity	Vietnamese names	Scientific names	Families
32	+	Cỏ sữa lông	Euphorbia hirta L	Euphorbiaceae
33	+	Cỏ sữa lá nhỏ	E. thymifolia L	Euphorbiaceae
34	+	Chó đẻ	Phyllanthus urinaria L	Euphorbiaceae
35	+	Thầu dầu	Ricinus communis L	Euphorbiaceae
36	+	Thủy thảo	Hydrilia verticillata (L.f) Royle	Hydrocharicaceae
37	*	Bèo cám Nhật	Lemna japonica L	Lemnaceae
38	*	Nhĩ cán vàng	Utricularia aurea Lour	Lentibulariaceae
39	++	Trinh nữ, mắc cỡ	Mimosa pudica L	H/P Mimosoideae
40	++	Sục sục tái	Crotalaria pallida Aiton	H/P Mimosoideae
41	+	Sục sạc lõm	C.retusa L	H/P Mimosoideae
42	++	Cóc kèn	Derris trifolia Lour	H/P Mimosoideae
43	+	Mắc mèo	Mucuna pruriens (L) DC	H/P Mimosoideae
44	+	Đậu ma	Pueraria phaseloides (Roxb)	H/P Mimosoideae
45	+	Cối xay	Abytilon indicum (L) Sweet	Malvaceae
46	+++	Chổi đực	Sida aucuta Burm f	Malvaceae
47	+	Bấ t à	S. rhombifolia ssp retusa (L) Boss	Malvaceae
48	+++	Ké hoa đào	Urena lobata L	Malvaceae
49	++	Muôi đa hùng	Melastoma affine D. Don	Melastomaceae
50	++	Mu ối lông	M. saigonense (Kuntze) Merr	Melastomaceae
51	*	Lục bình	Eichhornia crassipes (Maret) Solm	Pontederiaceae

Note:
Classifying according to Professor Pham Hoang Ho, book: "Trees of Vietnam country", (1991 -1993), chapter 1 – 5, Montreal Publishing.
The list of names according to order: A, B, C, D
Symbol: +: little ++: average
+++: much ☆: very much

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