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EFFECT OF THE USE OF SODIUM ALGINATE ON THE CHEMICAL, PHYSICAL AND MICROBIOLOGICAL QUALITIES OF SOME VARIETY OF DATES

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Abstract

This study was conducted on three types of Iraqi dates, one of solid varieties, and the other from semi-solid varieties and the last of soft varieties, and the study aimed to find out the effect of glazing and thermal transactions on the physical and chemical characteristics of dates The microbiology after storage for three months and was selected commercially known varieties and processed from farmers in southern Iraq specifically (Babylon Farms) and varieties are zohadi which is a solid variety, halawi is semi-solid and Al-Sukkari, which is a soft class, and the initial transactions were conducted after harvesting dates and included fumigation in The stone rooms with bromide gas are 1%, then sort the bad fruits as well as clean dates from the dust and impurities stuck in them, and the dates were then treated with temperatures (120, 130º) and for ten minutes, after which the dates were flooded in (sodium alginate solution 2%), Then the dates packed with plastic bottles and stored under cooling conditions 4º for three months, after which some physical, chemical and microbial qualities were estimated and included the concentration of total dissolved solids TSS, moisture, ash, P^H, glucose concentration, concentration of total sugars, Protein, fat, number of bacterium, and number of fungi, all these tests were compared with the treatment of control without adding before storage, and the results were analyzed statistically through a statistical program SAS system complete random design and study of the moral differences between the qualities studied at a moral level 5%.

Keywords: Sodium Alginate, microbiological qualities, dates

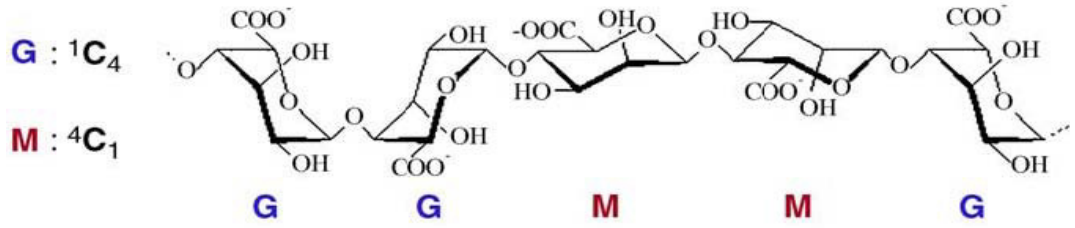
Introduction

Date palm (*Phoenix dactylifera* L.) is a dominant tree in South-West Asia and North Africa. Stages of maturity are (kHALAL, RUTAB, and Tamr) by color, texture, moisture and sugar content. Dates are fruits with high nutritional density, they are an important source of thermal energy because they contain a high percentage of sugars, and a good source of iron and potassium elements as well as a moderate source of calcium and magnesium, and also contain sulfur, phosphorus, copper and manganese, which are also rich Vitamins A, B7, B1, B2, C and for the main ingredients in dates are moisture, sugars, proteins, dissolved solids, fats and fiber (Abrahem, 2014), There is a need to use optimal storage methods for dates such as cooling and freezing in addition to the use of glazing to prolong the life of fresh date fruit and maintain the characteristics of their quality, and as a result of the great competition in the markets had to be added processes to improve the quality of dates in terms of appearance The most important of these processes is the glazing process that makes dates more attractive to the consumer and covers many other defects and the glazing process has a long history where wax was used to paint perishable foods as it prevents or reduces moisture loss, which avoids the shrinkage of food and makes its appearance shine, and in presses Dates in Algeria, France, and Tanzania dates were immersed in a sugar solution with the addition of glycerin to give it shine and luster (Al-bakr,1972), In Egypt, dates are also immersed before being pressed into alcohol, glycerin and water solution for glazing (AL-akidi, 1985) and have also been used as pure mineral oils that are tasteless and colorless. Glazing is generally accessible by melting the wax layer on the crust of the fruit and making it spread evenly on it, and to show the gloss in dates is placed in exposed trays with one layer and for a certain duration in an electric oven on a temperature with a regulator of air movement quickly, (Regg, 1944). Studies have also shown that placing dates on metal plates and then inserting them into the oven gives some varieties a clear shine when placed at (110-130º) for ten minutes (Abdul Hussein, 2011). He pointed out (Sahi, 1986) that the Glazing of dates is done by two factors, one physical by exposing dates to high temperatures for five minutes, then cooling them for half an hour, and the other chemical treatment is done using various chemicals where the use of diluted solutions of glycerol, molasses and liquid sugar. The results of the study showed that Glazing and cooled storage reduced the rate of changes to dates by reducing moisture loss, color changes and pH, all of which are considered to be standards of quality and quality of dates. He stated (AL-Akidi, 2010) that there are several Glazing mechanisms, including wiping dates with a soft bristle brush or wiping them with a cloth containing Glazing solution, or by covering dates directly in the Glazing solution, or spraying dates with Glazing solutions on a conveyor belt, and mentioning (AL-akidi,1985) the possibility of using wax to paint perishable foods Since wax reduces or prevents moisture loss, which avoids food shrinkage and makes its appearance glamorous, there are plenty of substances that can be used for this purpose such as paraffin, cholesterol, liquid sugar, carboxyl Methyl cellulose and sodium Alginate.

Alginate are non-branched biopolymers whose spine consists of a bond (1→4) β-D-mannuronic acid (M) and α-L-guluronic acid (G) (SASTA, 1985), Alginate are used in many food industries as stabilizers and thickeners as well as used in many pharmaceutical applications as well. Used in the packaging of bio-enhanced (beneficial bacteria) used in some food products such as yogurt and mayonnaise (Larsena, 2003) Alginate are also known as multiple sugars extracted from brown seaweed (16) in addition there are some types of soil bacteria capable On the production of Alginate such as *Azotobacter vinelandii* as well as *A. chroococcum* but they are not commercially available (ISP, 2007).

Form 1 : The chemical composition of Alginate (Vos, 2006).

Where m and G are located in four possible groups: MM, MG, GM, GG and GG, it can provide a large rotation of the glycoside bond (Smidsrod, 1997).



Form 2 : The backbone of Alginate (Vos, 2006).

The Alginate are usually marketed as powder and must be dissolved with water before use, and the Alginate have a high affinity for water and quickly clump when water is added to it so it is necessary to control the hydration of the Alginate to ensure that they do not lose their functions (Nussinovitch, 1997). To melt the Alginate completely they are usually mixed and dry with some sugars or a high-speed mixer is used to break down the formed blocks (Regg,1944), and must be fully hydrated and achieved by heating to a temperature of at least 70 °, this heating opens the structure of the Alginate and allows the water molecules to enter into All active sites.(Krasaekoopt, 2006), The shelf life of the Alginate extends for several months when they are in the form of sodium Alginate condition stored in a dry place away from sunlight, and if placed in the refrigerator they can be preserved for many years,12 and when combined the Alginate absorb water and form a sticky gum, and are able to absorb 200-300 times from Its weight is water, and the color of the Alginate ranges from white to yellowish brown, and because of its rapid absorption of water, it is used in encryption and the Alginate are considered non-toxic and non-irritating, The WHO has set an acceptable daily limit for alginic acid and sodium Alginate used as food additives at 25 mg/kg body weight. (D.pearson, 1970), Alginate are used as a thickener in the beverage and ice cream industry and in the packaging of certain foods.

Materials and Methods

Test Methods

Preparing Dates

The dates (Al-Zuhadi, Al-Halawi, and Al-Sukkari) were obtained for the 2018 season from the farms in Hilla-Babylon in the village of Hamza and the village of Mahweel and the dates were examined and treated at the Iraqi Company for the Manufacture and Marketing of Dates in Baghdad, and dates were prepared and treated as follows:

Fumigation : Methyl bromide gas was used to vaporize dates and the usage rate was 30 g/cubic meters for 24 hours and the operation was carried out in the American-made stone evaporator and is a closed room tightly closed with pipes for pumping gas to it, and the room is equipped with fans and treadmills to pull air from it after Enter dates in it, and leave dates in the evaporator for 24 hours to ensure the killing of all insects and their eggs.

Sorting and cleaning: The dates were sorted manually by experienced workers in the Iraqi company for the manufacture and marketing of dates and the fruits that are not suitable for filling were excluded and then a general cleaning of the dates was conducted to get rid of the dust stuck with the fruits as well as to get rid of impurities.

Washing and drying : Dates were washed and dried in the Iraqi company for the manufacture and marketing of dates and therefore used the line of washing and drying Italian facility, in which the water is pumped in the form of a spray from the top and bottom, then dried dates with dry air to remove water from them and can control the temperature of the air according to the quality of dates and the degree of moisture.

Heat treatment

Dates were treated with two temperatures (130,120 °) for 10 minutes to soften the outer shell of the dates.

Chemical treatment

The sodium Alginate solution 2% was prepared by dissolving the last in the water and then the dates were flooded in the solution for several minutes and at room temperature.

Packing and storing

The materials of the dates were filled with glitter and heat treatment in plastic containers and then closed with provisions and stored the models in the refrigerated store for three months at a temperature of 4°.

Preparing date juice

Date juice was prepared as mentioned (Al-fatlawi, 2013) for the purpose of conducting physical, chemical and microbiological tests.

Chemical tests

- **Humidity:** Humidity is estimated by the method mentioned (AOAC, 2000).

- **Ash:** Ash was estimated by the method in the (D,pearson1970).
- **PH:** The Ph of the water extract has been estimated to pass through hanna's PH meter.
- **Total sugars:** The sugars in the models were estimated by the Lane-Eynone method mentioned in (SASTA, 1985).
- **Glucose:** The concentration of glucose in the water extract of the date is estimated through the polarized light rotation characteristic of western-equipped Polarimeter.
- **Protein:** The protein was estimated in the Kieldahl method mentioned in (AOAC, 2000).
- **Fat:** The fat was estimated with the sukslet technique mentioned in (D,pearson, 1970).

Physical Tests

- **Concentration of total dissolved solids TSS :** The proportion of total dissolved solids in the date juice water extract was estimated using the Abbe Rfractometer device equipped by a company.
- **Color :** Estimate the color of the Spectrophotometer visual spectrometer as mentioned in (Al-fatlawi, 2013)
- **Refractive Index RI :** The refractive coefficient in the water extract for dates was estimated using carl Fisher's Abbe Rfractometer.

Biological tests

- **Total count bacterium :** The (Al-fatlawi, 2013) method was used to estimate the total bacterial number, plate count method.
- **Total count fungi :** The (Al-fatlawi, 2013) method was used to estimate the total bacterial number, plate count method.

Statistical analysis

The statistical analysis was carried out using the working experiment (3x3x4) according to the complete random design CRD to study the effect of chemical and physical transactions and class in different qualities and compared the moral differences between averages by testing the lowest moral difference LSD and used in that statistical program (SSP, 2004).

Results and Discussion

Chemical tests

Humidity : Table (1) Shows the effect of chemical and physical treatment and LSD contrast values at 0.05 varieties (V), thermal (T) and chemical (C) in humidity for the three varieties, and shows that average humidity has increased in varieties, the ratio has increased from 13.56, 13.59 and 15.84% in m Control factors to 14.41, 13.98% and 14.99% for halawi, zohdi, and Sukkari, respectively, while storage for three months, the ratio ranged from 14.23, 12.60, 16.70% for control treatment without adding 14.65, 14.14, 14.45% for halawi, zohdi, and Sukkari, respectively.

The high humidity in the items studied is due to its immersion in polishing solutions, where those solutions were prepared by dissolving them completely dissolved in the water so the immersion of dates in that water which contains polishing materials in the form of a real solution led to an increase in the humidity in the fruits However, the decrease in humidity after the storage period is due to the dry dates during storage, but the decrease was small and did not affect the sensory characteristics of the fruits.

Ash: Table (1) Shows the effect of chemical and physical treatment and its interdiction of LSD at 0.05 level of single-class interference (V), thermal coefficients (T), chemical (C), dual interference (V×T), (T×C, V×C) and Triple V×T×C in the percentage of total ash of the species Three, it turns out.

The percentages of ash increased with the change in thermal and chemical coefficients of the class, the increase in the proportion of ash may be due to the chemical composition of the substances used in the Glazing process as certain percentage of ash. Consequently, it has increased the final ash ratio of the fruits and may be due to differences in varieties.

PH : Table (1) shows the effect of thermal and chemical coefficients overlapping and LSD contrast values at 0.05 for single-class (V), thermal (T), chemical (C), Dual Interference (V×T), (T×C, V×C) and Triple V×T×C in the ph hydrogen characteristic of the varieties. The three, and it shows that the average values of pH have not been morally affected by the chemical treatment, and that the non-moral effect of chemical and thermal treatment on the values of the averages studied may be due to the chemical composition and chemical properties of the substance used in the process Glazing, sodium Alginate have an interaction with pH, where they become unstable at PH 10 (and deposit at PH 3.5) and since the PH of the varieties in control coefficients without adding is basically 6.9 so no moral effect appears as a result of the addition of sodium Alginate.

Total sugars: Table (1) Shows the effect of thermal and chemical varieties and coefficients overlapping and LSD contrast values at 0.05 for single-class interference (V), thermal coefficients (T), chemical (C), dual interference (V×T), (T×C, V×C) and Triple V×T×C in the total amount of class sugars Three, it is noted that the chemical treatment did not cause moral differences in the amount of total sugars relative to the varieties.

The non-effect of Glazing on the percentage of sugars in relation to the varieties studied may be due to the composition of the materials used in the Glazing process as they are derived substances and the clocos in them of the type associated with the carbohydrate chain, and even taste there is no sweetness.

Concentration of glucose:

Table (1) Shows the effect of adding chemical and physical coefficients and their LSD contrast values at the level of 0.05 for single-class (V), thermal (T), chemical (C), dual interference (V×T), (T×C), V×C and Triple (V T×C) in the content of the class of glucose, It is noted that the addition of sodium Alginate has had an unmoral effect on the content of the class of glucose.

The non-moral effect of Glazing dates in the characteristic of polarized light rotation is due to the chemical composition of the substance used in the Glazing process as the Alginate are non-branched binary polymers, i.e. they are also multiple sugars and may not be attributed to the change in the rotation of polarized light to the column.

The spine has a bond of a scallon (1→4) β-D-mannuronic acid (M) and α-L-guluronic acid (G).

Protein : Table (1) shows the effect of adding chemical and physical treatment, varieties, LSD contrast values at 0.05, single-type (V), thermal (T), chemical (C), Dual Interference (V×T), T×C, V×C and Triple V×T×C in the protein ratio of the items studied, It should be noted that the addition of chemical transactions did not morally affect protein content.

Fat : Table (1) shows the effect of adding chemical and physical coefficients, varieties and LSD contrast values at the level of 0.05 for single-class (V), thermal (T), chemical (C), dual interference (V×T), (T×C, V×C) and Triple V×T×C in the fat ratio of the items studied, It should be noted that the chemical addition and physical blinds have no moral effect on the lipid ratio.

Table 1: The effect of varieties, thermal transactions and chemical transactions on chemical qualities studied before storage and after the storage period of three months

Treat.		Humidity		Ash		pH		Total sugar		Glucose		Protein		Fat	
		0 Time	Month 3	0 Time	Month 3	0 Time	Month 3	0 Time	Month 3	0 Time	Month 3	0 Time	Month 3	0 Time	Month 3
Control	halawi	13.5666	14.2333	1.4616	1.7366	6.8330	6.8540	59.7500	57.1000	30.0991	30.0915	1.9916	2.1486	0.2413	0.3517
	zohadi	13.5916	12.6000	1.5708	1.5233	6.8348	6.9030	58.8250	63.8333	30.1675	30.1652	2.1083	2.2045	0.2885	0.3596
	Sukkari	15.8416	16.7000	1.6558	1.6400	6.8970	6.8970	62.3416	63.8333	30.8366	30.8393	2.0083	2.1669	0.3938	0.2096
V	halawi	14.4194	14.6590	1.5266	1.7433	6.8375	6.8375	60.5805	60.6221	30.3377	30.2499	2.1055	2.1099	0.2735	0.2749
	zohadi	13.9888	14.1465	1.5663	1.7022	6.8768	6.8768	59.7583	59.9817	30.2950	30.2533	2.1000	2.1008	0.2910	0.2926
	Sukkari	14.9916	14.4507	1.5747	1.7014	6.8970	6.8970	61.1388	61.2037	30.6005	30.6008	2.0805	2.0812	0.3301	0.3321
T	Control	14.3333	16.2000	1.5627	1.6666	6.8549	6.8548	60.3055	59.9810	30.3677	29.9625	2.0361	2.2045	0.3079	0.3195
	120	14.5222	14.9333	1.5438	1.3333	6.8863	6.8893	60.5333	60.9323	30.4050	31.1787	2.1388	1.7645	0.2874	0.3596
	130	14.5444	16.7000	1.5611	1.4900	6.8701	6.8740	60.6388	57.9100	30.4605	29.9132	2.1111	1.9015	0.2993	0.4335
C	Control	14.4666	14.2749	1.5559	1.8416	6.8515	6.8755	60.4925	60.7473	30.3977	30.3787	2.0851	2.0839	0.2877	0.2908
	Alginate 2%	14.4666	14.4666	1.5559	1.7080	6.8887	6.8660	60.4925	60.5815	30.4188	30.2958	2.1592	2.0586	0.2898	0.2904
$LSD_{(0.05)}$ V		0.3209*	0.8053*	0.1141	0.0415*	0.0425*	0.0133*	0.3098*	0.8073*	0.1522*	0.546*	0.0802*	0.1276*	0.0550*	0.0559*
$LSD_{(0.05)}$ T		0.3209*	0.8053	0.1141*	0.0415*	0.0425*	0.0133*	0.3098*	0.8073*	0.1522*	0.546*	0.0802*	0.1276*	0.0550*	0.0559
$LSD_{(0.05)}$ C		0.3705*	0.9298*	0.1318	0.0480	0.0491*	0.0153*	0.3578*	0.9322	0.1757*	0.6304*	0.0927*	0.1474*	0.0635	0.0646*
$LSD_{(0.05)}$ V×T		1.3349	1.2942*	0.2083*	0.0657*	0.0667*	0.0228*	1.6938*	1.4379*	0.4247	0.9599*	0.1835*	0.2328*	0.0953*	0.0651*
$LSD_{(0.05)}$ V×C		1.6926*	1.4916*	0.2323*	0.0781*	0.0783*	0.0257*	2.2083*	1.6791*	0.5214*	1.0980	0.2090*	0.2649*	0.1127	0.1121
$LSD_{(0.05)}$ C×T		1.7888*	1.4701*	0.2521*	0.0795*	0.0818*	0.0259*	2.3760*	1.6613*	0.5571*	1.0867*	0.2011*	0.2596*	0.1121*	0.1094*
$LSD_{(0.05)}$ C×T×V		1.1115*	2.7895*	0.3954*	0.1439*	0.1473*	0.0460*	1.0733	2.7967*	0.5271*	1.8913*	0.2780*	0.4421*	0.1905*	0.1937*

*The results are a rate of three repeaters, *there are moral differences at 0.05, Non-Significant: N.S.

Table 2: The effect of varieties, thermal transactions and chemical parameters on the physical qualities studied.

Treat.		TSS %		RI		Color	
		0 Time	Month 3	0 Time	Month 3	0 Time	Month 3
Control	Halawi	86.5166	86.5166	1.3464	1.3461	2.4297	2.1379
	Zohadi	86.4833	86.4433	1.3477	1.3447	2.3587	2.5145
	Sukkari	84.2166	84.2146	1.3468	1.3468	3.0286	3.2233
V	Halawi	85.6361	85.6360	1.3479	1.3487	2.6096	2.8346
	Zohadi	86.0861	86.0860	1.3489	1.3529	2.4857	3.0690
	Sukkari	85.0444	85.0443	1.3480	1.3596	2.7651	2.8484
T	Control	85.7388	85.2842	1.3470	1.3472	2.6057	2.6207
	120	85.5250	85.2411	1.3490	1.3491	2.6361	2.5514
	130	85.5027	86.2767	1.3488	1.3487	2.6186	2.6882
C	Control	85.5962	85.5704	1.3479	1.3564	2.6201	2.7645
	Sodium alginate 2%	85.5925	85.5962	1.3480	1.3485	2.6201	0.7312
$LSD_{(0.05)}$ V		*0.3551	*1.4117	*0.0023	*0.0026	*0.1522	*0.1522
$LSD_{(0.05)}$ T		*0.3551	*1.4117	*0.0023	*0.0026	*0.1522	*0.1522
$LSD_{(0.05)}$ C		*0.41	1.6301*	0.0026*	*0.003	*0.1757	*0.1757
$LSD_{(0.05)}$ V×T		*1.415	*2.3605	0.005*	0.0045*	0.4247	0.4247
$LSD_{(0.05)}$ V×C		1.7767	2.7124	*0.0058	*0.0052	*0.5214	*0.5214
$LSD_{(0.05)}$ C×T		*1.8606	*2.7432	*0.0055	*0.0053	*0.5571	*0.5571
$LSD_{(0.05)}$ C×T×V		*1.2300	*4.8904	*0.0078	*0.0091	*0.5271	*0.5271

***The results are a rate of three repeaters, *there are moral differences at 0.05, Non-Significant: N.S.**

Physical Tests:

- **Total Soluble Solid (T.S.S.) :** Table (2) Shows the effect of chemical and physical transactions and their interdiction of LSD at 0.05 for varieties (V), thermal (T), chemical (C), dual interference (V×T), (T×C) and triple (V×T×C) in the percentage of total dissolved solids (TSS) For the three items before and after the storage period and it is clear from the table that there are no moral differences for the varieties, but there are moral differences in the bilateral and triple overlaps in relation to the varieties with temperatures and with chemical treatment.
- **Refractive index :** Table (2) Shows the effect of sodium gene addition, physical processing, interdiction and LSD

contrast values at 0.05 for single-class (V), thermal coefficients (T), chemical (C), bilateral interference (V×T), (T×C, V×C) and triathlon (V×T×C) in the refractive value coefficient It is clear from this that the averages of refractive factor values were not morally affected with the addition of the chemical and the calories used before and after the storage period. Since the refractive factor is used as an estimate of the proportions of sugary substances and dissolved solids, therefore the chemically and thermally treated dates have not been morally affected by these transactions due to the chemical composition of the substance used in the polishing process, which is a non-sugary carbohydrate. It causes moral differences in the refractive coefficient.

- **Color :** Table (2) Shows the effect of thermal and chemical varieties and coefficients overlapping and LSD contrast values at 0.05 for single-class (V), thermal coefficients (T), chemical (C), dual interference (V×T), (T×C, V×C) and Triple (V×T×C) in the color unit of the three varieties The difference in color units of the varieties is due to the pigments responsible for the composition of the distinctive basic color of the different varieties.

Biological tests:

- **Total count bacterium :** Table (3) Shows the effect of varieties, thermal transactions, chemical transactions overlapping and LSD contrast values at 0.05 for single-class (V), thermal coefficients (T), chemical (C), dual interference (V×T), (T×C, V×C) and Triple (V T×C) in microbial counting For the three varieties, it is noted that thermal processes and chemical treatment caused a decrease in the total number of bacterium, that the decrease in the total bacterial number of average values of varieties is due to the chemicals used in the process of Glazing and chemical composition and may be attributed to the gelatin network encapsulated the fruit from the outside and reduced the chances of bacterial contamination, as the sodium Alginate when melted in the water consists of a strong gel network that acts as a protective casing of the fruit from contamination.
- **Total count fungi :** Table 3 shows the effect of varieties, thermal transactions and chemical transactions overlapping and LSD contrast values at 0.05 for single-class (V), thermal (T), chemical (C), V×T, T×C and V×C and Triple (V T×C) in the number of yeasts And the aid for the three varieties, it is noted that thermal transactions and chemical treatment caused a decrease in the number of yeasts and fodder, and the reason for the decrease in the number of fungi is due to the preparation of dates for the three varieties, which included washing and cleaning dates from dust and impurities as the washing of dates Drying reduces microbial counting, as well as the treatment of fumigation with methyl bromide-like gas by 1%.

Table 3: The effect of varieties, thermal transactions and chemical treatment in the microbiological qualities studied before storage and after storage time.

Treat.		Total count bacterium 10xcfu/g		Total count fungi 10xcfu/g	
		0 Time	Month 3	0 Time	Month 3
Control	Halawi	9.9333	10.3333	10.1666	11.6666
	Zohadi	8.9333	0.0000	12.0833	14.4666
	Sukkari	6.5166	10.3333	10.5750	13.6666
V	Halawi	8.7388	4.5721	10.3611	11.0069
	Zohadi	9.6000	7.0166	11.9666	12.2083
	Sukkari	7.0444	2.9610	10.6997	10.5412
T	Control	8.4611	4.4000	10.9416	11.6666
	120	8.4611	5.4000	11.0108	10.6666
	130	8.4611	4.4000	11.0750	10.0000
C	Control	14.4000	4.1482	13.9255	10.0370
	Sodium alginate 2%	6.4814	4.0370	10.0370	13.9255
$LSD_{(0.05)}$ V		*0.9479	*0.6641	1.1017	0.9905
$LSD_{(0.05)}$ T		*0.9479	*0.6641	*1.1017	*0.9905
$LSD_{(0.05)}$ C		*1.0946	0.7668*	*1.2721	1.1438*
$LSD_{(0.05)}$ V×T		4.2401	*1.1387	*2.8777	*1.5986
$LSD_{(0.05)}$ V×C		*3.6690	1.3099*	*2.9144	*1.8869
$LSD_{(0.05)}$ C×T		3.7255	1.3187	*3.1091	*1.8890
$LSD_{(0.05)}$ C×T×V		*3.2837	*2.3005	*3.8164	*3.4313

*The results are a rate of three repeaters, *there are moral differences at 0.05, Non-Significant: N.S.

Recommendations

We recommend the design of Glazing systems in the plants of press and filling dates according to the conclusions of this study, and it is possible to be designed so that the Glazing process is carried out either by immersion dates in tanks containing Glazing materials or by spraying Glazing materials on dates in a spray form, as well as studying the possibility of using materials Other chemicals to perform the Glazing process such as the gum of xantan, arabic gum and pectin, also study the use of other criteria for conducting Glazing such as temperature and concentration of chemicals used in Glazing, and according to the conclusions of this study we recommend the need to conduct another study specialized in The effect of Glazing materials in reducing microbial pollution of dates.

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