

ARTICLE

STUDY THE EFFECT OF PLANTING DATE ON IRANIAN MASSES OF LETTUCE TRAITS IN GREENHOUSE CONDITIONS

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ABSTRACT

Sustainable agricultural development is a system of production, which relies on modern agricultural practices and by using these practices, and consideration of environmental issues, the economic and production, efficiency gets enough attention. The importance of the agricultural sector, in the areas of economic, social, political, etc. in our country, and the sensitive role of natural and base resource in this sector, to achieve sustainable agricultural development, have put considerations before us. In this paper, we review the planting lettuce in the greenhouse, and study the planting date effects on some agronomic characteristics and Iranian lettuce growth parameters under greenhouse conditions. After preparing seed of four Iranian lettuce Masses from endemic areas of Ardebil, Fasa, Borazjan and Shadegan, seeds were planted in three planting dates at intervals of 20 days in a greenhouse, the planting seedling date was prepared in greenhouse plots, at four-leaf stage, about 25 days after transplanting date. The number of row crop grown in each period, for each of the Masses, were planted in three rows of length 1.8 m, row spacing of 50 cm and plant spacing apart in the rows 25cm, the experiment was done in factorial in the form of a completely randomized design. Factors measured included quantitative traits of performance, head weight, head length and width, number of leaves per head, head congestion, leaf length and width and thickness of the leaves. According to the results obtained in this study, it was concluded that time and Masses and interaction between time and Masses have different effects on quantitative traits of lettuce in greenhouse conditions.

INTRODUCTION

Today, the growing population and increased demand for agricultural products, including vegetables and Saifi in the world has led to the severe restriction of water and arable soil, but by using science and research experiences, strategies to increase performance, and reducing the cost per unit area can be offered. Tehran, for its proximity to the consumer market, home to 20 percent of the population, supply and distribution centers of greenhouse products in the whole country and other neighboring countries is the benefits of greenhouse production, in Tehran province. To achieve the best conditions for plant growth is the significant issues in the scientific and research centers and finding the best planting date can be as practical scientific achievements, to achieve maximum performance, in relation to cultivate plants in greenhouses.

Lettuce plants and its history of culture are dating back over 4,500 years and BC in ancient Egypt. [12] Lettuce is a native product from the Mediterranean and Siberia Sea, despite its use in almost all parts of the world; it is one of the world's oldest vegetables. Birthplace of lettuce is Asia and most likely, Iran and Turkestan. Lettuce is planted as the Food and Drug more than 2,500 years and is used more. Some writings indicate that, in the year 550 BC, Persian kings have ordered to cultivate it and have used it. Historical background of lettuce suggests that, in Europe, in 1494, people have planted on their land, have recognized it and have used it as a food. [3]

Mr. McMahon (1806) has mentioned 16 varieties of lettuce; Columbus brought these to America for the first time and they were including plants that have been planted there after the discovery of America. In 1880, there were more than 20 varieties of lettuce in America and agricultural research station in New York in 1885 has listed 873 varieties of lettuce, that each of which have certain specific name. Since the beginning of agriculture in Egypt, they have discovered its beneficial properties. Christopher Columbus as brought the lettuce seeds to the New World, so that from the early fifteenth century AD, lettuce was planted in Haiti and the Bahamas. Altogether, there are two types of lettuce: 1. Farming and domestication lettuce that is used in salad and the round lettuce and Iranian lettuce are the most important form of it. 2. Wild or self-propelled lettuce. Iran's lettuce is better than round lettuce in terms of food. Round lettuce has no nutritional value. [6]

A group of researchers has considered India as the origin place of lettuce that requires different lighting, the most suitable soil, loamy light soil with humus and organic materials, sensitive to drought and salinity, pH 5.5 to 7.5, narrow seed with bumps, viability 4 years, soil temperature for germination at least 2

KEY WORDS

Lettuce, Date of Planting, Greenhouse, Iranian Masses and Performance

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degrees, the ideal temperature of production 15-19 degrees, as well as super cold nature and its healing properties. [11].

Yield of the crop depends on the terrain and the type of lettuce and care, but, on average, the amount is between 25 to 35 tons per hectare, which is among the factors, the planted lettuce, how to plant, weather (minimum-maximum temperature and precipitation), the structure and the soil type and so on can be named. [12]

In this study, greenhouse environment has been suggested as a scientific tool for growing lettuce that in addition to providing suitable environmental conditions for growth provides conditions for the farmers to produce a production in certain seasons or a certain area that, in normal circumstances, it will be impossible or uneconomical. Due to the advantages for Tehran province, the use of scientific research to achieve maximum performance, in susceptible planting and production crops in greenhouse conditions, we can create profitability and provide the consumer market and focus on exporting, while preventing irregular imports of agricultural products, prevent the outflow of currency from the country and build self-esteem and provide employment among the graduates in agriculture. In this study, at first, we assume that there are differences between the Iranian lettuce masses in the greenhouse cultivation, as well as, performance differences in different planting dates of lettuce in the greenhouse. It has been tried to examine the most suitable date for cultivation in greenhouses and introduce the best Iranian lettuce masses appropriate for cultivation in the greenhouse and in addition to adequate profitability for the manufacturer, students will exploit the results of scientific research and scientific centers.

Literature, frameworks and theoretical foundations of research

Lettuce families: Compositae (family: Asteraceae), its scientific name is *Lactuca sativa* L., the English name: Lettuce, Persian name: lettuce, Arabic name: Khas, yearling, a smooth and hairless drawn leaf. They know its origin *serriola* that today was created in the course of mutation types. Farm Lettuce derived from *Lactuca serriola* and easily allows crossing between them [6]. Lettuce Farm, derived from *Lactuca serriola*, and easily allows crossing between them [6]. Given the importance and the extent of greenhouse horticultural crops in the world, about 307 thousand hectares in 2007 and accounting 65% of it to the vegetable and the irrefutable issue of Iran percent of total greenhouse considering the world is about 2.36 percent. Iran greenhouses level in 2009 was more than 7 thousand 710 hectares. Tehran province with the level of cultivation in 2503 hectares, Kerman with 1,100 hectares, Isfahan with 983.8 hectares and Yazd province with 935.3 hectares respectively ranked first to fourth acreage of greenhouses in the country. Interestingly greenhouse vegetable cultivation in 2009 years was about 5258 ha, and the provinces of Tehran with 1361 ha, Kerman with 1043 ha and Yazd province with 922 ha, respectively ranked first to third greenhouse vegetable cultivation.

According to the sedative and blood-making of lettuce and lettuce properties in the treatment of rheumatism, bronchitis, convulsions, heart, spleen tract obstruction, ulcer, urinary tract and bladder, strengthen the stomach, prevent constipation, increase milk in lactating women, the presence of iron minerals, calcium, potassium, phosphorus, iodine, magnesium, zinc, manganese, copper, protein, vitamins C, A, and B and the importance of maintaining and developing indigenous mass in Iran, have attracted academics and students to this plant. So study the best conditions and planting date are recommended in a scientific study. Today, the cultivation of lettuce is done with two goals of extracting the oil from seeds and consuming fresh. [11]

Lettuce has different types, but three kinds of lettuce (leaf, head and cos or romaine) are the most common. Lettuce is divided into seven main groups, that each of which has many species. Lettuce has great varieties that these varieties are divided into specific categories. One of these divisions is as follows.

- 1 - Criapnead Leuce: this type of head lettuce is strong and breaks easily.
- 2 - Butterneadluce: lettuce that is very narrow and their heads are soft and have reactionary.
- 3 - (Cosor Romain lettufe) Chicory or Romain lettuce: This type of head lettuce has long narrow leaves.
- 4 - (Looselefunchiny lettlice) paty seat lettuce: The head lettuce is free and open.
- 5 - (Stemlettuce) shoot Dole lettuce: This type of lettuce has long flowers, and its edible stems (seed stalks) are cookable. [2]

• Another division of the lettuce

1. Round Lettuce, 2. Normal lettuce, 3. Leaf or leaves lettuce and 4. Stems lettuce. In round lettuce, this type of lettuce leaves is fairly compact on each other. The inner leaves are white and the outer leaves are green. One of the best varieties of lettuce to transfer to the regions is the normal Lettuce, this type of lettuce is standing and perhaps the plant height reaches 40-30 cm. The outer leaves are green and soft and the inner leaves are green-white that are soft and fragile. In leaf lettuce or leaf lettuce, the leaves are not overlapping and are separated. Leaves are not fragile and edges have tooth. Iran is not in favor of this lettuce and it is called soft leaf lettuce, and bright green leaves. In stem lettuce, its stem is usable and sometimes subtle and small leaves are also used. Iran does not use this type of lettuce [2].

Performance and lettuce production in Iran and the world

Lettuce is the only plant of lettuce family that is grown commercially. FAO reported that production of lettuce and chicory in 2010 was 23,622,366 tons, of which 53% was produced in China, 17% in the United States and 4% in India. Although China is the largest producer of lettuce around the world, most of

this amount is consumed within the country. Spain is the largest exporter of lettuce around the world and the United States is in second place instead.

Table 1: Ten largest producer of lettuce and chicory 2011

Country	Production amount (Tons)	Source
China	12574500	FAO's estimation
United States of america	3954800	Officially
India	998600	FAO's estimation
Italy	843344	Officially
Spain	809200	Officially
Japan	537800	Officially
Iran	402800	FAO's estimation
France	398215	Officially
Turkey	358096	Officially
Mexico	340976	Officially
World	23622366	Total

Lettuce environmental requirement

Lettuce is a cool season plants. Therefore, in cold and partly humid temperate regions, the best result of planting this crop will be achieved. By planting seeds during seasons that the plant's growth would not encounter to extreme heat, it can be used in all areas. Lettuce is among the vegetables that can be cultivated all year round in case of favorable weather, planting and harvesting the lettuce takes about 150 days. If the lettuce harvesting happens in hot weather, before growth, flowering branches will appear and lettuce plant will give seed, at this time, the leaves will have a nasty bitter taste and will become unusable. The best area for the cultivation of lettuce is cold and wet areas. During winter crops, due to incessant rains, leaves lettuce will be produced that have soft and thin leaves. Lettuce sensitivity to light is different, today by using eugenic methods, lettuce are produced that are neutral day. Mild and wet weather is not suitable for all kinds of spring, while summer variety will result in this kind of weather. In areas that have freezing winter, lettuce will be planted in the spring and in areas with cool summer, it is planted as summer cultivation and in tropical areas, it is planted in autumn and winter. (Kargar, 2007)

• Climatic conditions for the cultivation of lettuce

Seeds of late and resistant to heat kinds can be planted until late April and its product can be used till late June and early July, fresh lettuce can be planted in all seasons. In areas with monthly mean temperature of 12 to 15 degrees Celsius, it is well bred; lettuce is very sensitive to high heat, and when there is high temperature, its leaves begin to tip burn. At 30 degrees, the seeds will not germinate and asleep. The lettuce farm needs a lot of watering, and it should not be completely dry. The best way watering approach is surface irrigation, if possible, it is sprinkler irrigated. Raising the ambient temperature should be between 16 and 18 in days and between 10 to 12 degrees Celsius in the nights. Lack of soil moisture and dryness of the air, reduces product and its quality declines and excessive moisture will lead to increased pest. The survey by the Research Institute of the Academy of Sciences of Cuba has done in terms of production, shows that lettuce cultivation under the cover of crop or under the shade, do not lead to accumulation of bitter materials in leaves. (Zeraei, 1995)

• Desirable soil-planting lettuce method

Lettuce can be grown in different soils, but a cultivation place of lettuce should be very smooth and with no major agglomeration. Spring lettuce will grow in light lands better and summer kind give a good result in areas with adequate water. The most suitable land for lettuce is light loamy soil (Limon) that has lots of organic matter. Medium-heavy soils with humus material that has good permeability and high water holding capacity (sandy loam or clay soils) are suitable for this plant. PH for lettuce is suitable 5.5 to 6.5. The amount of seed required for one square meter of treasury land is about 100. 2 g of modified and high value seeds are enough to provide 1000 seedlings of lettuce. Planting seedlings in the mainland in commercial planting will be done with olericulture machines and in cm 25 × 25 or 25 × 30. Usually for a variety of summer and autumn kinds, sowing is done in mainland and after seedling emergence; additional seedlings are sparse on the row. Planting depth is about 1.5 to 2 cm planting spacing cm 40 × 30 or cm 30 × 30, and the amount of consuming the seeds around 2 to 5.2 kg per hectare. In large cultures, seeding machines are seeding. (Zeraei, 1995)

This plant grows in two ways

1) Nursery 2) planting lettuce in the main ground: the root cause of a plant nursery is because lettuce is a demanding plant, in the smaller land, the food supply and crop care will be done cheaper and easier. However, if they want to grow in the main ground, weeding and thinning operation is expensive. The best method of planting in the main ground is the linear method (mower) and in wide culturing, this will be done by seeder machine. In a mechanical planter, a six-row Planter is used. After seedling emergence, the shrubs should be thinned as recommended. Today, the tapes containing the seed are marketed; that the

seed will be placed at appropriate intervals within the resolved bar, the bar germinates beneath the soil by tractor seeds at specified intervals. (Maleki et al., 2012)

METHODS

The public need and actions to plant a lot of leafy vegetables needs to review and research before planting, this research investigates the best physical and chemical soil conditions, light requirements, need fertilizer, crop water requirements, the tensions and eventually the important issue, the greenhouse conditions and the best planting date.

Specifications the location of the experiment

This plan was done in year 2012 at the center of floriculture and vegetables in greenhouses located in District 11 of Tehran in Razi Municipality Cultural Center.

- The introduction of treatments

Planting date and Masses were experimental Treatments. Planting date was on three levels (09.10.2012, 01.10.2012 and 21.10.2012), and a pile of Iranian lettuce were in four levels (Ardabil, Fars, Shadegan and Borazjan), respectively.

- Experiment design

Testing was done for factorial in randomized complete projects. The total number of experimental plots was 12 plots, and each plot was divided into three rows of cultivation and for each mass, in each planting date, a plot was randomly selected. Four Iranian lettuce seed mass has been prepared from its indigenous areas and the seeds were planted in a nursery with an interval of 20 days and after the plants had 4-3 leaves in the nursery, they were transferred to the mainland (plots of greenhouse with dimensions 1.5 * 1.8 m). They are cultivated at intervals cm 20 to 25 on rows cm 50 to 60. Factors for measurement included performance, head weight and length and width, number of leaves in the head, head congestion, leaf length and width, leaf thickness. Lettuce seeds related to the masses of Borazjan, Ardabil, Fasa and Shadegan first was done 20 days of each other (09.10.2012, 01.10.2012 and 21.10.2012) in 100 seedling trays without the use of soil and only by using transplanting Coco peat and then at four leaf stage, about 25 days after transplanting date, it was transferred to greenhouse soil for seedlings.

Data collection methods and statistical analysis

This study, after expressing the matter and in terms of the purpose is practical - developmental, and in terms of research methodology is experimental - analysis. In addition, to collect literature and theoretical concepts, the library method is used.

Using different methods, the data were examined in order to test questions and research hypotheses. Collected data should be processed scientifically. Research variables and their dimensions were analyzed through the comparison of the mean table and the variance analysis table and correlation coefficient table, in the simple correlation coefficient table of specification and variance analysis table, symbols ns, * and ** are respectively, insignificant, significant at the possibility level of 5 and 1%. In addition, in the mean comparison tables, numbers with similar letters do not have a significant difference at the possibility level of one percent. For charting, Excel and SPSS software were used and for data analysis, SAS 9.2 program was used and for comparing the means, Duncan test was used.

- Methods - cultural practices
- Preparing the ground

The total area of greenhouse is 50 square meters covered with polyethylene, that has 12 plots, with dimensions of 1.8 * 1.5 m, and air conditioning with fan and cooling system (air suction and entering and collision of outside air) coated with cellulose. In addition, in order to create the heat required, at the end of November and December, the electric fan heaters with thermostats had been used. Greenhouse height, at the sides was 3.5 and in the center of the greenhouse was 5.5m, at first, the surface greenhouse soil was up-and-down with shovels to a depth of about cm30, and the clods were crushes and were become flat and watered by using a trowel.

Table 2: Physical and chemical properties of soil in greenhouses plots

Physical and chemical properties of soil in greenhouses plot			
Depth cm	0-30	The electrical conductivity(ds/m)	2.1
Clay%	21	Total acidity saturation(PH)	7.00
Silt%	36	Saturation(S.P)%	36
Sand%	43	Percentage of organic carbon(O.C)%	0.50
Available potassium(ppm)	170	Available phosphorus(ppm)	9.5
Loamy soil			

Due to the physical and chemical properties of soil, about 150 pure nitrogen was sprayed, three times (each 50 g), with mixed watering and one time before planting, and twice during planting. The greenhouse is not shading problem with respect to the lighting and qualified workers controlled the temperature and humidity with minimum-maximum thermometer and hygrometer. Then, each plot was divided into three rows of planting, the row spacing was 50 cm from each other and the distance between holes in the rows

for planting ready seedlings was considered about cm 25, therefore, according to plot size, spacing between shrubs up to four sides of each plot was remained about cm25. Therefore, the number of shrubs for each mass in the period of sowing was 18 shrubs and the total of four masses shrubs, in a period of sowing was 72 shrubs and the total number of tested shrubs, in this test was a total of three periods planting of 216 shrubs.

- plantin

Initially, the seeds were planted in a nursery, on 100 planting trays without adding soil and fertilizer, simply by filling holes in the tray, with a mixture of perlite and Coco peat, according to the announced schedule, at a depth of about one cm. In addition, because of the sensitivity and preventing drought, planting trays were named after the names of the masses, with the label on each of the trays and were placed in another greenhouse that the moisture required was controlled by mechanical systems. In addition, after, the seedlings have 3-4 leaves, they were transferred into splitted plots of the greenhouse, and were planted in the prepared pits, by observing to avoid tensions and damage to roots, and immediately, and the first irrigation was done. In order to contact roots with the soil, the transplanting soil was slowly crushed by foot (seedlings, along with Coco peat, around the roots, were extracted from planting trays pits and were planted in the ready pits in the greenhouse. In addition, due to the possibility of a conflict, rather than transplanting transmitted, two seedlings were planted in the desired location, so that if needed, one of the seedlings will be thinned after a while.

Ripen

In order to achieve proper plant density in the 6-8 leaf stage, the thinning and removal of weeds were done. In addition, for fertilizing, the urea fertilizer, as much as a third 50 grams, was used according to the number of plants and dissolved plots in water. According to the greenhouse soil moisture, especially, the soil around, the bushes were irrigated on average, twice a week.

Harvest

The plots product was harvested to evaluate the ultimate performance of quantitative traits, about two months after the date of transplantation transfer, (12.15.2012, 01.04.2013 and 01.24.2013).

Estimating the growth parameters

In order to have a better evaluate of testing treatments, Growth analysis was performed. This requires accurate sampling. To calculate the growth characteristics, first, the tables with the name of mass and evaluated traits were designed and with simple equipment, such as kitchen scales, meters, digital caliper and PC, random sampling, and measurement and recording the desired traits were done.

How sampling and measurement of quantitative traits:

With regard to the four plots in each harvest period and due to the number of rows of each plot and the number of plants per row, two plants of each row, six plants of each plot were randomly harvested from a depth of 1 to 2 inches of soil. The harvested plant numbers were recorded in the table and by using the above equipment, the length and width of leaves, head height and width, head weight, head, leaf thickness and counting the number of leaf consumption was performed. In the end, according to the average weight of plants, yield was calculated per unit area.

Analysis of data

The analysis of the data, with standardized instruments is one of the key tenets of each study. To investigate the influence of planting dates, mass influence as well as the interaction between planting date in masses, analysis of variance test was used. In Table 3, the results of this test, for each of the traits, are presented. As indicated in Table 3, for the leaf length, the planting date was at 5% level and masses at the 1% level are effective on the leaves, but the interaction of the masses in planting date does not have a significant effect on the length of the leaf. On the leaf width, planting date and the masses at the 1% level is effective on the leaf width, but the interaction of the masses in planting date does not have a significant effect on the leaf width.

For the thickness of leaves, planting date at the 5% level and the masses at the 1% level are effective on the thickness of the leaves, but the interaction of the masses in planting date does not have a significant effect on the thickness of the leaves. Planting date has a significant effect at the 1% level on the weight of the head. However, the masses, and the mass interacts in planting date do not have a significant effect on the weight of the head. About the head height and width of the head, the planting date is effective at the 5% level and the masses, at the 1% level on the head height and the head width; however, an interaction of masses in the planting date does not have a significant effect on head height and width.

In the number of leaves, planting date at the 1% level has a significant effect on the number of leaves, but the masses are not significantly affected, however, the interaction between planting date in the mass at the 5% level has an impact on the number of leaves. Finally, according to Table 3, only time at the 1% level

has a significant effect on the performance and the masses as well as an interaction of mass in planting date does not have a significant effect on performance.

Table 3: Analysis of variance

Analysis of variance table average of squares									
Sources Change	Degrees of freedom	Leaf length	Leaf width	Leaf thickness	head weight	Head height	Head width	Number of leaves	Performance
planting date	2	67.23*	29.85**	0.0042*	78234.03**	124.29*	202.86*	91.76**	5006977.78**
Mass	3	304.77**	26.91**	0.0172**	16015.28 ^{ns}	305.14**	196.80**	37.67 ^{ns}	1024977.78 ^{ns}
Mass planting date	6	8.34 ^{ns}	7.20 ^{ns}	0.0020 ^{ns}	13313.19 ^{ns}	25.90 ^{ns}	25.60 ^{ns}	45.20*	852044.44 ^{ns}
Experimental error	24	12.88	5.13	0.0009	8257.99	27.60	37.72	12.61	541311.11
Coefficient of variation (%)	-	13.28	18.45	8.74	24.54	18.41	19.61	13.45	24.54

ns, * and ** are respectively, the absence of significant difference, a significant difference in the level of 5% and 1%

Now, due to the impact or the absence of impact of planting date, mass and mass interaction between planting date, for each of the variables under consideration, we will discuss in continue and in the following paragraphs, in detail, about the effects of which planting date (10/09/2012, 01.10.2012 and 21.10.2012) or which mass (Ardabil, Fasa, Borazjan or Shadegan) and which interaction.

The effect of planting date:

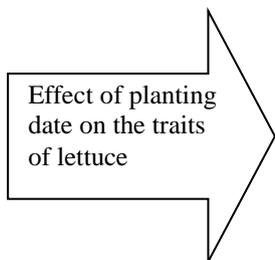
In [Table 4], the mean comparison of planting dates effect on the leaf length, plant width, leaf thickness, head weight, head height, head width, Number of leaves for consumption and performance per unit area is shown.

Table 4: Comparison of the average effect of planting date on the traits of lettuce

The mean comparison of planting dates effect on the traits in lettuce									
Trait	Time	Leaf length(cm)	Leaf width(cm)	Leaf thickness(mm)	head weight(gr)	Head height(cm)	Head width(cm)	Number of leaves	Performance(gr per m ²)
	10/09/2012	29.042 a	13.92 a	0.3560 a	416.25 a	30.31 a	34.52 a	27.54 a	3330.0 a
	01.10.2012	27.604 a	12.15 ab	0.3575 a	426.25 a	30.46 a	32.77 a	28.42 a	3410.0 a
	21.10.2012	24.417 b	10.77 b	0.3244 b	281.67 b	24.81 b	26.69 b	23.25 b	2253.3 b

The Column with the same letters are not significantly different.

In summary, the findings on the effect of planting date on the physical characteristics of lettuce are shown in[Fig. 1] and we continue the discussion:



<p style="text-align: center;">Leaf length</p> <p>The effect of planting date on the length of the leaf is significant at the 5% level. After reviewing Comparing the date of planting, it found no significant difference between two dates during the first and second cultivation in leaf length, but on the third planting date, a significant difference between the leaf length and the two previous dates was created. In addition, the maximum length of the leaf was observed in the first planting date and the minimum length of the leaf was observed on the third planting date.</p>
<p style="text-align: center;">Leaf width</p> <p>The effect of planting date on the width of the leaf is significant at the 1% level. After reviewing Comparing the date of planting, it found no significant difference between two dates during the first and second cultivation in leaf width, also there was no significant difference in the third and second planting date between the leaf width and there is a significant difference between the third and the first planting date in leaf width. In addition, the maximum width of the leaf was observed on the first planting date and the minimum was observed on the third planting date.</p>
<p style="text-align: center;">Leaf thickness</p> <p>The effect of planting date on the thickness of the leaf is significant at the 5% level. After reviewing Comparing the date of planting, it found no significant difference between two dates of the first and second cultivation in leaf thickness, but on the third planting date, a significant difference between the leaf thickness and the two previous dates was created. In addition, the maximum thickness of the leaf was observed in the second planting date and the minimum was observed on the third planting date.</p>
<p style="text-align: center;">head weight</p> <p>The effect of planting date on the weight of the head is significant at the 1% level. After reviewing Comparing the date of planting, it found no significant difference between two dates of the first and second cultivation in head weight, but a significant difference was created on the third planting date and the first and second dates between head weight and on the third date, the head weight was reduced significantly. The maximum weight of the head was observed in the second planting date.</p>

<p>Head height</p> <p>The effect of planting date on the height of the head is significant at the 5% level. After reviewing Comparing the date of planting, it found no significant difference between two dates of the first and second cultivation in head height, but a significant difference was created on the third planting date between the head height and two previous dates and in the third planting date, the head height was reduced significantly. The maximum height of the head was observed in the second planting date.</p>
<p>Head width</p> <p>The effect of planting date on the width of the head is significant at the 5% level. After reviewing Comparing the date of planting, it found no significant difference between two dates of the first and second cultivation in head width, but a significant difference was created between the third planting date and the first and second dates in the head width and in the third planting date, the head width was reduced significantly. The maximum width of the head was observed in the second planting date.</p>
<p>Number of leaves</p> <p>The effect of planting date on the number of leaves is significant at the 1% level. After reviewing Comparing the date of planting, it was found a significant difference between the third planting date with the first and second in the number of leaves, but there was no significant difference between the first and second dates in the number of leaves. The minimum number of leaves was observed on the third planting date and the maximum was observed in the second planting date.</p>
<p>Performance per unit area</p> <p>The effect of planting date on the performance is significant at the 1% level. After reviewing Comparing the date of planting, it found no significant difference between two dates of the first and second cultivation in performance per unit area, but a significant difference was created between these two dates with the third planting date in the performance and the performance was reduced significantly in the third planting date. The maximum performance was observed in the second planting date.</p>

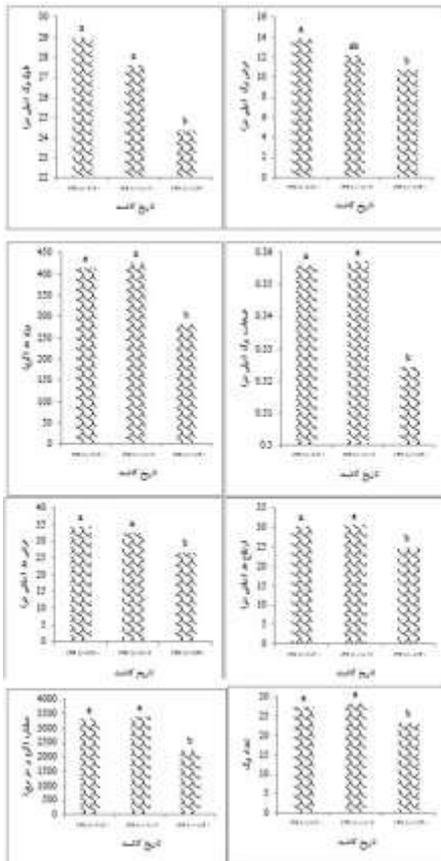


Fig. 2: graphs of the effect of planting date on the physical characteristics of lettuce are plotted:

Mass Effect

In [Table 6], Mean comparisons of different masses on leaf length, leaf width, leaf thickness, head weight, head height, head width, number of leaves and performance per unit area are shown.

Table 6: Mean comparisons of different masses, on the traits

The mean comparison of different masses on the traits in lettuce									
Trait	Mass	Leaf length(cm)	Leaf width(cm)	Leaf thickness(mm)	head weight(gr)	Head height(cm)	Head width(cm)	Number of leaves	Performance(gr per m ²)
Ardabil		33.89a	13.08a	0.3664b	331.11a	33.53a	38.17a	26.17ab	2648.9a
Borazjan		22.39c	12.39a	0.3975a	418.06a	21.00c	28.72b	28.17a	3344.4a
Fasa		29.81b	13.81a	0.3167c	346.94a	26.89b	30.44b	23.17b	2775.6a
Shadegan		22.00c	9.83b	0.3033c	402.78a	32.69a	27.97b	27.67a	322.2a

The Column with the same letters are not significantly different.

In summary, the findings in the effect of mass on the physical characteristics of lettuce are shown in [Fig. 3] and we continue the discussion:

Effect of mass on the traits of lettuce

Leaf length
There is a significant difference between the study masses at the 1% level on the leaf length. After reviewing Comparing the date of planting, it was found no significant difference between Borazjan and Shadegan masses, but these two masses have a significant difference with Ardabil and Fasa masses. In addition, there was a significant difference between two masses of Fasa, Ardabil in leaf length and the minimum leaf length was observed in Shadegan, and the maximum leaf length was observed in Ardabil.
Leaf width
There is a significant difference between the study masses at the 1% level on the leaf width. There was no significant difference between three masses of Ardabil, Borazjan, Fasa, but Shadegan mass had a significant difference with these three masses in leaf width, and the leaf width reduced. The minimum leaf width was observed in Shadegan, and the maximum leaf width was observed in Fasa.
Leaf thickness
There is a significant difference between the study masses at the 1% level on the leaf thickness. There was no significant difference between three masses of Fasa and Shadegan, but these two masses had a significant difference with Ardabil and Borazjan masses in leaf thickness. The minimum leaf thickness was observed in Shadegan mass, and the maximum leaf thickness was observed in Borazjan.
head weight
There was no significant difference between the study masses on the head weight. There was no significant difference in terms of head weight. The minimum head weight was observed in Ardabil mass, and the maximum was observed in Borazjan.
Head height
There is a significant difference between the study masses at the 1% level at the head height. There was no significant difference between Ardabil and Shadegan masses, but these two masses had a significant difference with Fasa and Borazjan masses in head height. There was a significant difference between two masses of Borazjan and Fasa in terms of the head height. The minimum head height was observed in Borazjan, and the maximum was observed in Ardabil.
Head width
There is a significant difference between the study masses at the 1% level on the head width. There was no significant difference between three masses of Borazjan and Shadegan and Fasa in head width, but these three masses had a significant difference with Ardabil mass in head width. The minimum head width was observed in Shadegan, and the maximum was observed in Ardabil.
Number of leaves
There was no significant difference between the study masses on the number of leaves. There was no significant difference in Borazjan, Ardabil and Shadegan mass, but these Borazjan and Shadegan masses had significant differences in Fasa mass in terms of the number of usable leaves. The minimum number of leaves was observed in Fasa mass, and the maximum was observed in Borazjan.
Performance per unit area
There was no significant difference between the study masses on the performance. There was no significant difference in the four masses of Borazjan, Ardabil, Fasa and Shadegan. The minimum performance was observed in Ardabil mass, and the maximum was observed in Borazjan.

In [Fig. 4] graphs of the effect of mass on the physical characteristics of lettuce are plotted:

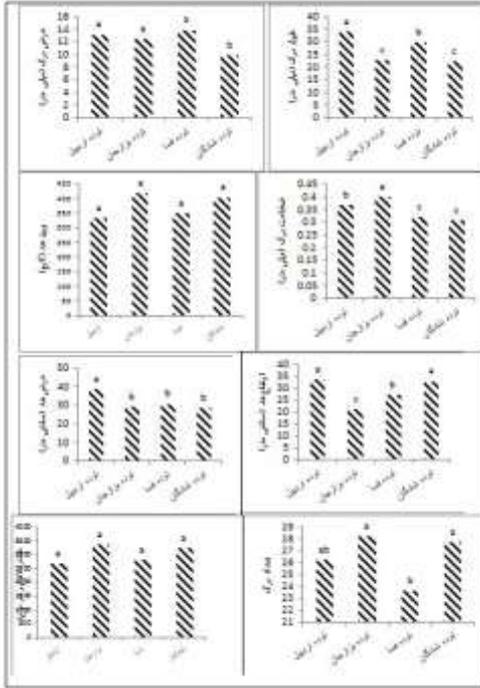


Fig. 4: Charts for mass effect on the physical characteristics of lettuce

Interaction between planting date and the mas:

In [Table 7], Mean comparisons of interaction between planting date and the mass on leaf length, leaf width, leaf thickness, head weight, head height, head width, number of leaves and performance per unit area are shown.

Mean comparisons of interaction between planting date and the mass on the traits in lettuce									
Mass	Time	Leaf length(cm)	Leaf width(cm)	Leaf thickness(mm)	head weight(gr)	Head height(cm)	Head width(cm)	Number of leaves	Performance(g per m ²)
Ardabil	6.21 x	37.00a	14.08ab	0.3725bc	371.67bcd	35.83ab	43.25a	26.00 b-f	2973.3bcd
	7.10	33.00ab	12.67bcd	0.3592bcd	333.33bcd	32.75a-d	38.75ab	24.50 c-f	2666.7bcd
	7.30	31.67abc	12.50bcd	0.3675bc	288.33cd	32.00 a-d	32.50 a-d	28.00 a-e	2306.7cd
Borazjan	6.20 x	23.17d-g	13.42abc	0.3883b	408.33a-d	21.17ef	30.00bcd	28.83 a-d	3266.7 a-d
	7.10	25.67 c-f	14.42ab	0.4467a	558.33a	23.17def	34.00 a-d	33.83a	4466.7a
	7.30	18.33g	9.33 cd	0.3575bcd	287.50cd	18.67f	22.17d	21.83 ef	2300.0 cd
Fasa	6.20 x	32.42ab	17.00a	0.3275cd	425.83 a-d	30.08 a-e	34.67 abc	24.50 c-f	3406.7 a-d
	7.10	29.33 bcd	12.00bcd	0.3158 cde	330.83 bcd	27.25 b-f	28.17 bcd	24.00 def	2646.7 bcd
	7.30	27.67 b-e	12.42 bcd	0.3067 de	284.17 cd	23.33 def	28.50 bcd	22.33 def	2273.3 cd
Shadegan	6.20 x	23.58 d-g	11.17 bcd	0.3358 bcd	459.17 abc	34.17 abc	30.17 bcd	30.83 abc	3673.3 abc
	7.10	22.42 efg	9.50 cd	0.3083 de	482.50 ab	38.67 a	30.17 bcd	31.33 ab	3860.0 ab
	7.30	20.00 fg	8.83 d	0.2658 e	266.67 d	25.5253 c-f	23.58 cd	20.83 f	2133.3 d

The Column with the same letters are not significantly different.

Table 7: Comparison interaction of planting date × the mass in traits

Leaf length

The interaction of the mass in planting date was not significant on the leaf length. After reviewing the mean comparison, the interaction of mass was cleared in planting date. There was no significant difference between the first date of Borazjan mass with the second and third date of Shadegan mass in leaf length. However, there was a significant difference between the interaction of the first date of Ardabil mass with the first date of Borazjan and Shadegan masses. However, the minimum leaf length was observed in the third planting date of Borazjan mass and the maximum leaf length was

Effect of planting date and the mass on the traits of lettuce

observed in the first planting date of Ardabil mass.
<p style="text-align: center;">Leaf width</p> <p>The interaction of the mass in planting date was not significant on the leaf width. There was a significant difference between the first planting date of Ardabil, Fasa and Borazjan mass with the third planting date of Shadegan mass in leaf width. There was a significant difference between the first planting date of Fasa mass with the second and third planting date of Ardabil, Fasa and Borazjan mass in leaf width. The minimum leaf width was observed in the second planting date of Borazjan mass and the maximum leaf width was observed on the third planting date of Shadegan mass.</p>
<p style="text-align: center;">Leaf thickness</p> <p>The interaction of the mass in planting date was not significant on the leaf thickness. There was a significant difference between the second planting dates of Borazjan mass with other dates and other masses in leaf thickness. However, there was no significant difference between the second planting date of Ardabil mass with the third planting date of Borazjan mass and the first date of Shadegan mass in leaf thickness. The minimum leaf thickness was observed in the third planting date and Shadegan mass and the maximum leaf thickness was observed in the third planting date of Borazjan mass.</p>
<p style="text-align: center;">head weight</p> <p>The interaction of the mass in planting date was not significant on the head width. There was a significant difference between the second planting date of Borazjan mass, the first planting date of Borazjan, Fasa and Shadegan masses and the second planting date of Shadegan mass with other dates and masses in terms of head weight. The minimum head width was observed in the third planting date of Shadegan mass and the maximum head width was observed in the third planting date of Shadegan mass.</p>
<p style="text-align: center;">Head height</p> <p>The interaction of the mass in planting date was not significant on the head height. There was a significant difference between the first, second and third planting date of Borazjan mass with the first planting date of Ardabil and Shadegan mass in head height. There was a significant difference between the third planting dates of Ardabil mass with the third planting date of Borazjan mass in head height. But there was no significant difference between the second and third planting date of Ardabil mass with the second planting date of Borazjan and the first, second and third planting date of Fasa masses in head height. The minimum head height was observed in the third planting date of Borazjan mass and the maximum head height was observed in the second planting date of Shadegan mass.</p>
<p style="text-align: center;">Head width</p> <p>The interaction of the mass in planting date was not significant on the head width. There was no significant difference between the first planting dates of Ardabil mass with the first planting date of Fasa mass in head width. There was a significant difference between the first planting dates of Borazjan mass with the first planting date of Shadegan mass in head width. The minimum head width was observed on the third planting date of Borazjan mass and the maximum head width was observed in the first planting date of Ardabil mass.</p>
<p style="text-align: center;">Number of leaves</p> <p>The interaction of the mass in planting date in head width was significant on the number of leaves at the 5% level. The planting date became clear, there was a significant difference between the second planting date of Borazjan mass and the second planting date of Ardabil and Fasa mass in the number of leaves. There was no significant difference between the first and second planting dates of Shadegan mass with the third planting date of Ardabil mass. The minimum number of leaves was observed on the third planting date of Shadegan mass and the maximum number of leaves was observed on the second planting date of Borazjan mass.</p>
<p style="text-align: center;">Performance per unit area</p> <p>The interaction of the mass in planting date was not significant on the performance. There was a significant difference between the second planting date of Borazjan mass with the first, second and third planting date of Ardabil, second and third planting date of Fasa mass and the third planting date of Shadegan mass in performance. There was no significant difference between the first planting dates of Borazjan mass with the first, second and third planting date of Ardabil, Fasa and Shadegan mass in performance. The minimum performance was observed on the third planting date of Shadegan mass and the maximum head height was observed in the second planting date of Borazjan mass.</p>

In [Fig. 5] interactions of the planting date and the mass on the physical characteristics of lettuce are plotted:

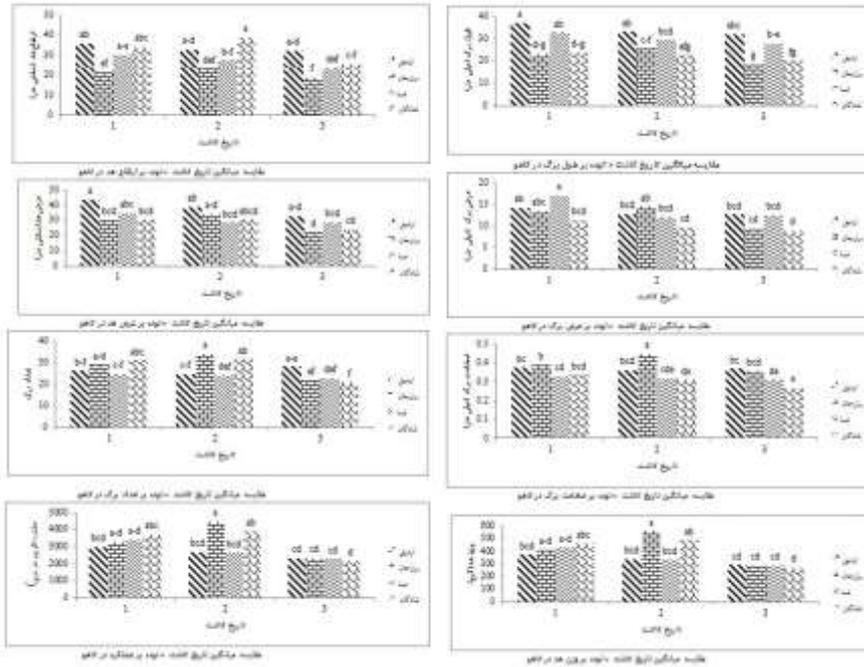


Fig. 5 : Charts for interaction of planting date and mass effect on the physical characteristics

○ Correlation coefficient

Pearson correlation coefficients in [Table 8] is listed to examine the relation between each of the traits

Table 8: Pearson's correlation coefficient for the relation between traits

Correlation	Leaf length(cm)	Leaf width(cm)	Leaf thickness(mm)	head weight(gr)	Head height(cm)	Head width(cm)	Number of leaves	Performance(gr per m ²)
Leaf length(cm)	1							
Leaf width(cm)	0.704*	1						
Leaf thickness(mm)	0.208**	0.489**	1					
head weight(gr)	0.036**	0.360**	0.504**	1				
Head height(cm)	0.485**	0.053**	0.185**	0.257**	1			
Head width(cm)	0.861**	0.674*	0.450**	0.328**	0.583*	1		
Number of leaves	0.019**	0.211**	0.599*	0.867**	0.334**	0.321**	1	
Performance(gr per m ²)	0.267**	0.014**	0.260**	1.00**	0.057**	0.136**	0.774**	1

ns, * and ** are respectively, the absence of a significant difference, a significant difference in the level of 5% and 1%

[Table 8] shows a significant positive correlation between leaf length and leaf width, the higher length of the leaves, the leaf width more increase significantly. In addition, there was a significant positive correlation between leaf length and the width of the head, the higher length of the leaf, and the width of the head increases significantly. There was no significant relation between leaf length and other traits. There was a positive and significant relation between leaf width and the width of the head, with increasing leaf width, the width of the head increases.

There was a significant and positive correlation between the thickness and number of leaves. With increasing leaf thickness, the leaf number increases.

There was a significant positive relation between head weight and number of leaves as well as the performance. With increasing head weight, number of leaves increases as well as with increasing head weight, the performance increases.

There was a positive and significant correlation with 95% confidence between head height and head width, by increasing the head height, the head width increases.

There was a positive and significant relation between the number of leaves and the performance with 99% confidence, with an increase in the number of leaves, the performance increases.

RESEARCH FINDINGS

According to the fact that the variance analysis test table is general, maybe, there a significant difference between the lowest and highest average of traits, that cannot be identified by using variance analysis tables, that is due to the uniform distribution of averages related to trait levels of study around the total average, so, in an average comparison table, by using Duncan test, in general, any small fluctuations between level traits are identified and maybe, according to Duncan test, a significant difference will be observed. For example, an interaction effect between the date of planting and leaf length was not significant, after examining the comparison of average for mass interaction effect in the date of planting, It was found a significant difference in the first date of Ardabil mass with the first date of Borazjan and Shadegan mass on the leaf length or according to the table; an interaction effect between the date of planting and the leaf width was not significant, after checking Compare average, an interaction effect between the date of planting became clear, in the first planting date of Ardabi, Fasa and Borazjan masses with the third planting date of Shadegan mass, there was a significant difference in leaf width attribute, also there is a significant difference in the first date of planting of Fasa mass with the second and third planting date of Ardabil, Fasa and Borazjan mass in a width of the leaf.

CONCLUSION OF THE RESEARCH

In the hypothesis of this study, it was predicted a difference between the masses of Iranian lettuce in the greenhouse cultivation, also there was a difference between the different dates of planting lettuce in the greenhouse. Of course, in this study, different quantitative traits, including leaf length and width, head height and width, thickness and number of leaves and the performance per unit area between four masses of Iranian lettuce (Ardabil, Fars, Borazjan and Shadegan) was determined, therefore, in the general view, there was a significant difference in three planting dates between the traits, which in the following the traits are discussed and concluded.

In studying the effect of planting date, it was concluded no significant difference between the first and the second planting date in leaf length, but in the third planting date, a significant difference was created between the leaf length and two previous dates. There was significant difference between two planting dates of first and second, second and third in the leaf width, but a significant difference was created between third and first planting date in leaf width, also, there was no significant difference between the first and the second planting date in the thickness of leaves, but in the third planting date, a significant difference was created with the previous two planting dates, also there was no significant difference between the first and the second planting date in the head weight, but a significant difference was created between the third planting date and the first and second planting date in the head weight, also there was no significant difference between the first and second planting date, at head height, but a significant difference was created on the third planting date with two previous dates, also, there was no significant difference between the first and the second planting date in the width of the head, however a significant difference was created between the third planting date and the first and second planting date, also a significant difference was created between the third planting date with the first and second in the number of leaves, but there was no significant difference between the first and second date in the number of leaves, and finally, there was no significant difference between the first and second planting date in the performance per unit area, however, these two planting dates were created a significant difference with the third planting date in the performance [Table 4-2].

In studying the effect of the mass, it was concluded no significant difference between Borazjan and Shadegan masses in the length of the leaf, but these two masses were significantly different with the masses of Ardabil and Fasa, and there was a significant difference between the two masses of Fasa and Ardebil in terms of the leaf length, also, there was no significant difference between three masses of Ardabil, Borazjan and Fasa in terms of leaf width, but Shadegan mass was significantly different with these three masses in terms of leaf width, also there were no significant differences between the masses of Fasa and Shadegan in leaf thickness, but these two masses were significantly different with masses of Ardabil and Borazjan and there was a significant difference between the two masses of Borazjan and Ardebil in terms of leaf thickness, also, there was no significant difference between the four masses of Ardabil, Borazjan, Fasa and Shadegan in terms of the weight of the head, also, there was no significant difference between the masses of Ardabil and Shadegan in the height of head, but two masses were significantly different with the masses of Fasa and Borazjan and there was a significant difference between the two masses of Borazjan and Fassa in terms of head height, also there was no significant difference between three masses of Borazjan, Fasa and Shadegan in terms of the width of the head and the three masses were significantly different with the masses of Ardabil in terms of the width of the head, also there was no significant difference between the three masses of Borazjan, Ardabil and Shadegan in

the number of leaves and masses of Borazjan and Shadegan were significantly different with the Fasa mass in terms of the number of leaves, ultimately, there was no significant difference between four Borazjan masses of Borazjan, Ardabil, Fasa and Shadegan in terms of performance.

According to compare the research results with the results of other researchers in the field to study the effects of planting date on various plants, it can be seen that planting date and variety have a significant effect on the performance and characteristics of various plants, for example, in the research of Mr. Balandari and Rezvani, in 2010, about the effect of planting date (23.04, 11.09 and 01.11.2010) and density of shrub on the leaf surface traits, leaf dry weight, stem and inflorescence dwarf chicory, the results show that, planting date has significant effects on dry weight, and the highest dry weight was in a second planting date and the lowest was in the third planting date that are similar to the results of this study about the second planting date of Borazjan lettuce and the third planting date of all masses. Or in the investigation of Mr. Abu Talib and colleagues, about the effect of planting date on components and performance of two varieties of Hamedan and Ramhormoz garlic in 2010, the test results showed that the effect of planting date (23.10, 06.11, 21.11 and 06.12.2010) and the number of leaves, plant height, stem diameter and performance is significant, that are similar to the results, about the effect of planting date and the masses on the lettuce traits, of course, in this study, some characteristics, in some masses of the first planting date was significant compared to other masses, like the first date in Ardebil mass and the first date in Borazjan mass had significant difference in leaf width attribute that were in conflict with the results of Mr. Aboutalebi, based on Hamedan varieties in the first cultivate had a significant superiority in all traits compared to the Rāmhormoz type. Compared with the results, Mr. Seyedi and Nemati about the effect of the arrangement and planting date (20.1, 30.1, 10.2 and 20.2) on melon fruit performance and components in Jarju area in 2007, results showed that the effect of planting date on performance, average weight and number of melon fruits were significant per hectare and were the most widely performance in the first planting date, that in comparing with the results of this study, it was similar to the effect of planting date on lettuce traits, but in the performance of lettuce in this study, the difference between the first and second planting date was not significant, but both tests were similar about the significant reduction of performance in the third planting. In addition, the results of Mr. Hosseini Darani and his colleagues, in 2011, about the effects of planting date (09.04, 19.04, 29.04 and 05.09.2011), on the traits of stem height, stem diameter and dry weight and performance of two varieties of spinach, the results showed, firstly, the planting date and variety and interaction on all traits were significant except for diameter, secondly, the maximum height was in the first planting and in foreign varieties and the most diameter was in the second planting, in the comparison of these cases with the results of this study, firstly, the planting date effect and the mass in the lettuce was significant in all traits, secondly, in lettuce about the height and width of head, the difference was not significant between the first and second planting date and in the third planting, the difference was significant and have been reduced and also at head of lettuce, the difference between Ardabil and Shadegan mass was not significant and in the width of the head of lettuce, the difference between Fasa and Borazjan and Shadegan masses was not significant. In another comparison with the results of Mr. Alam et al., In 2003, about the effect of planting date (10, 20 and November 30 and 10, 20 and 30 December) and the distance for the production of lettuce in the Hill area, the results showed, the highest production was in the first planting that has contradicted compared with the results of this study because the highest performance in this study was in the second planting date. Of course, in the greenhouse, because of the control over certain environmental conditions and plants, as well as the same water and temperature supply under greenhouse conditions, in different growth times, performance reduction in greenhouse on different dates than the declining performance in a different time of open spaces was low or perceptible. In addition, compared with other products, lettuce is the vegetable groups that are plant able under greenhouse conditions. In addition, the production of lettuce in the greenhouse and out of season is cost effective, and according to the average of lettuce production performance per unit area, in outdoor farms in the country, the average performance of lettuce production in the greenhouse is more than open space and is economical.

SUGGESTIONS

To obtain practical results, it is suggested:

- ♣ To examine the effect of planting date on the time it takes to reach the maximum yield of lettuce in the greenhouse.
- ♣ To examine the effect of planting date on the duration of flowering lettuce in the greenhouse.
- ♣ To test in an extensive level and in greenhouse conditions.
- ♣ To examine the effect of planting density and density on yield and disease outbreaks under greenhouse conditions.
- ♣ To examine the effect of planting date on the duration of storage after the harvest.
- ♣ To examine the effect of planting date, drought, salinity and pH on yield under greenhouse conditions.
- ♣ To examine the effect of planting date and heavy metals on yield in greenhouse conditions.
- ♣ 10- Effects of planting date will be examined and compared between the lettuce and other vegetables grown in greenhouses.

- Limitations

Since the research was conducted in the same condition of greenhouse, there was no certain limitation during the study.

CONCLUSION

After studying the Effects of planting date on the lettuce quantitative traits, it was found that planting date at the 5% level is significant in the leaf length, the most leaf length was in the first planting date, as well as the planting date, at 1% level is significant in the leaf width and the maximum leaf width was in the first planting date, as well as planting date at the level of 5% is significant in leaf thickness and the maximum leaf thickness was in the second planting date, also the planting date at 1% level was significant in head weight and the maximum head weight was in the second planting date. The planting date at the 5% level was significant in head height and the maximum height of the head was in second planting date, as well as planting date at the 5% level was significant in the width head, and the maximum width of the head was in the first planting date, as well as planting date at the 1% level was significant in the number of leaves and the highest number of leaves was in the second planting date, finally, planting date at the 1% level was significant in performance and the maximum performance was in the second planting date. On the other hand, in all of the traits in lettuce, the lowest was in the third date. After studying the Effect of mass on quantitative traits of lettuce, it became clear that mass, at the 1% level was significant in the leaf length and the maximum leaf length was in Ardabil mass and the lowest was in Shadegan mass, also the mass was significant at the level of 1% in leaf width and the maximum leaf width was in Fasa mass and the lowest was in Shadegan masses. The mass was significant at the 1% level in the thickness of the leaf and the maximum leaf thickness was in Borazjan mass and the lowest was in Shadegan, also the mass had no significant effect on head weight and the maximum weight of the head was in Borazjan mass and the lowest was in Ardabil mass. Also the mass was significant at the 1% level in the height and width of the head and the maximum height and width of the head was in Ardabil mass and the lowest was in Borazjan and Shadegan, as well as the mass had no significant effect on leaf number and the highest number of leaves was in Borazjan mass and the lowest was in Fasa mass and ultimately, the mass had no significant effects on performance and the highest performance was in Borazjan mass and the lowest was in Ardabil mass.

After examining the interaction effect of mass in planting date, it became clear, the interaction effect of planting date and the mass was not significant in length, width and thickness of leaves, height, width and weight of the head, and the performance and it was significant only in the number of leaves, at 5% level, and the maximum length of the leaf was in the first planting date of Ardabil mass and the lowest leaf width was in the third planting date of Shadegan mass, as well as the maximum leaf thickness was in the second planting date of Borazjan mass and the lowest leaf thickness was in the third planting date of Shadegan mass, as well as the maximum head weight was in the second planting date of Borazjan mass and the minimum was in the third planting date of Shadegan mass. Also the maximum head height was in the second planting date of Shadegan mass and lowest was in the third planting date of Borazjan mass, the maximum width of the head was in the first planting date of Ardabil mass and the lowest was in the third planting date of Borazjan mass and also, the maximum number of leaves was in the second planting date of Borazjan mass and the lowest in the third planting date of Shadegan mass and finally, the maximum performance was in the second planting date on Borazjan mass and the lowest was in the in the third planting date of Shadegan mass.

CONFLICT OF INTEREST

There is no conflict of interest.

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None

FINANCIAL DISCLOSURE

None

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