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Research Dissertation

Vegetable Marvel of Dykva

Completed by:
Marina Zueva,
Yulia Ivanova,
Alexandra Khmelkova
8th grade

Scientific adviser:
Elena Igorevna Salnikova
Kapitsa Phystech Lyceum ANPEO
biology teacher

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Introduction

Our work's topic: Vegetable Marvel of Dykva (Melon Pumpkin Cross). In the course of our research experiment, we tried to grow a melon in the conditions of the Moscow region. In our opinion, the topic is quite relevant and promising. In our country, many vegetables and fruits are imported from abroad, which significantly increases their cost for consumers. There are not enough vegetables and fruits from the warm regions of Russia to stock up the country's population. To replace expensive imported fruits and vegetables on the market with local ones, you need to grow them not only in the south of the country, but also north of the middle zone. However, we understand that there are a number of difficulties in accomplishing such a task, for example, climate, soil composition, etc.

In our article, we find out whether it is possible to grow such a heat-loving crop like melon in the Moscow region. If it becomes possible to grow heat-loving fruits and vegetables in our region, it will greatly simplify the logistics of supplying them to our tables and will allow us to buy both raw and processed products at lower prices. The establishment of various enterprises for growing and processing purposes, i.e. the creation of new jobs, maybe a derivative positive result in this way.

Objective of our research article: Grafting Melons and Pumpkins. Get a harvest of melon pumpkin in the Moscow region. Compare the rates of growth and development of Dykva in the greenhouse and in the open field.

Hypothesis: It is possible to grow a heat-loving crop in the Moscow region with the relevant selection of pumpkin and melon varieties, and their grafting.

Tasks:

- To study the requirements for the growing conditions of pumpkin and melon;
- To master the technology of grafting Cucurbitaceae,
- To make a series of grafts,
- To assess the survival and yield of the hybrids obtained
- To study the content of carotenoids in hybrids.

Research methods:

- analysis of literature and videos on the topic
- observation over grafting of check samples
- monitoring the development of seedlings
- comparison of the growth of samples in the greenhouse and in the open field
- harvesting
- sensory analysis of uncooked Dykva, Dykva jam
- questionnaire based on the results of sensory analysis

Chapter 1.

1.1.Environmental Requirements for Growing Pumpkins.

Pumpkin is a monocyclic herbaceous plant. Three types of pumpkins are widespread: summer squash, large gourd, and cushaw.

The root system of the plants is well developed. The roots penetrate into the soil to a depth of 1 m, their length is 4-5 m and more. They cover more than 10 m3 of soil, which makes adult plants less affected by drought.

The stem is climbing, its length is 3-4 m. Varieties with a bushy habit have been created.

The leaves are large, without stipules, with long petioles.

Flowers are dioecious. Male and female flowers are formed on the same plant. Pollination is carried out only by insects, mainly bees, since the pollen is heavy, so it cannot be carried by the wind.

Flowers open in the morning, very early (about 4 o'clock) and by 9 o'clock they fade. With a cold snap, prolonged rains, very hot weather, and dry winds, when the bees do not fly, the flowers remain non-pollinated and therefore fall off.

The fruits are very diverse in shape and color. Their surface is smooth, net-convex, tubercled or segmented. The size of the fruit varies over a very wide range (from several tens of grams to 60-80 kg), and the length - from several centimeters to 30-40 cm.

Seeds are elliptical, of varying size, rounded at one end, and pointed at the other. Some pumpkin forms have seeds without a shell. The absolute weight of seeds is 140-360 g. They remain viable for 3-4 years.

The homeland of the pumpkin is tropical and subtropical regions. It is a heat-loving and light-loving plant. For normal development and fruiting, the sum of positive temperatures during the growing season should be at least 2500 °C. Some early ripening varieties of summer squash are less demanding on environmental conditions.

Seeds begin to germinate at temperatures above 14 °C, but the optimum temperature for germination is 25-28 °C. Young plants are sensitive even to slight spring frosts. Fluctuations in air and soil temperatures during the growing season adversely affect the growth and development of plants. The optimum temperature is 22-28 °C.

The pumpkin plant has a huge leaf area and requires a lot of water, therefore, despite its powerful root system, it often suffers from a lack of moisture, and watering gives good results. When grown without irrigation, high yields are obtained only on moisture-intensive soils. Prolonged dry and strong winds have a negative effect on the development and especially on the fruiting of plants, therefore, when growing pumpkin in open areas, curtain plants are used, which creates a favorable microclimate in the sowing.

Pumpkin plants require large amounts of nitrogen, phosphorus, and potassium in an easily digestible form. Dunging is very effective. Usually 30-40 tons of manure is applied per hectare. In addition, significant doses of mineral fertilizers are required: 300 kg of ammonium nitrate, 500 kg of superphosphate, and 200-250 kg of potassium sulfate per 1 ha.

Pumpkin plants thrive best on loose, well-aerated, humus-rich soils; therefore, rich alluvial soils, sandy loam, and chernozemic structural soils are most suitable for growing them. On heavy, cold soils, pumpkin plants do not grow well. On light, sandy soils of the southern slopes, they dry out quickly due to lack of moisture and give low yields. Like cucumbers, they are very demanding on their predecessor, the best of which are crops that enrich the soil with nutrients, make it loose and structural. Pumpkin seeds, in turn, are very good predecessors for all crops, with the exception of representatives of the same family. [1]

1.2.Environmental Requirements for Growing Melons

Melon is a monocyclic plant of the pumpkin family. This heat-loving crop is widely cultivated in Central Asia, Krasnodar Krai. However, gardeners are trying to grow it in the midland, and even in Siberia.

Melon is a herbaceous monocyclic plant, its root system is poorly developed, and the leaf surface is smaller than that of a watermelon. Flowering begins 35-40 days after germination. First, the male flowers bloom, and then the female ones. The flowers are bisexual, i.e. one flower contains both pistil and stamens. At the same time, pollination is better cross-fertilized with other plants. The female flowers are on a longer pedicel. The fruit shape is different: flattened, spherical, cylindrical, and their surface is smooth, segmented, meshy.

Melon is an extremely light-loving crop. With a lack of sunlight, fruits do not set well, their taste sharply deteriorates. Melon is heat-demanding. Seeds begin to germinate at 15 °C, but the optimum temperature is 24-30 °C. At temperatures below 15 °C, the seeds rot, the emerging seedlings are affected by damping-out. Adult plants die from prolonged low temperatures down to 3-5 °C. Short-term frosts down to -0.5 °C are detrimental to both seedlings and adult plants. Plants do not tolerate sharp temperature fluctuations during the day. Melon grows well on light soils rich in organic matter.

In order to grow melons in the midland in the open field, you need to pick up early maturing varieties and hybrids, as well as to grow it through seedlings in a well-lit place, arranging beds for better soil warming.

For growing seedlings, the largest and most filled seeds are selected, they are pickled in a dark purple solution of potassium permanganate for 30 minutes, then washed well in running water. It is best to germinate the seeds in a damp cloth before sowing. A good yield is obtained by germinating seeds in a solution of trace elements during the day. Melon is sown at the same time as cucumbers, at the end of April, to be planted in the ground with 28-30 day old seedlings, when frosts have passed. Melon does not tolerate relocation, therefore, it is planted in separate pots or bags with a diameter of 8-10 cm.

If it is not possible to grow seedlings in a greenhouse or hothouse, they are grown indoors on a light windowsill or illuminated with a fluorescent lamp, which is placed at a distance of 10-15 cm from the seedlings. The soil for seedlings is the same as for cucumbers (loose humus, garden soil, 0.5 liters of ash per bucket). The soil must be steamed, with 1 tbsp of superphosphate, 1 tsp of potassium sulfate added. On heavy soils, peat is added. When 3-4 mm seedlings appear, the seeds are sown in pots, 2 pieces at a depth of 1.5 cm, covered with foil and placed in a dark place. The temperature when growing seedlings should be 18-19 °C and not higher than 27 °C.

In a greenhouse or hothouse, seedlings must be provided with good lighting, ventilation, and protection from frost and low temperatures. When growing seedlings in a room or on a veranda,

hardening of seedlings is required. Seedlings are watered moderately, avoiding the stem to get wet. [1]

1.3.How to Grow a Crop in an Alien Environment.

The main difference in climatic conditions between regions for the cultivation of heat-loving crops is the number of warm summer days. This is what leaves an imprint not only on the conditions for caring for plants, but also on the way they are planted in the beds. The cultivation of such crops is extremely difficult only in regions with a harsh climate, for example, in Siberia.

The Moscow region belongs to the Midland, and this is an area which is risky to grow thermophilic vegetables and fruits in. You can get a normal harvest in the Moscow region by using seedlings only. Seeds should be sown no earlier than mid-April; daylight hours at this time are already quite enough. Seedlings are planted in early summer on small mounds. People often arrange a "smart bed" for this: the soil well-filled with organic fertilizers is covered with a black film, and melon seedlings are planted in holes cut in it. And even on such a bed, young sprouts are covered at night in the first little bit. As soon as flowers begin to appear, the coating is to be removed: by this time real warmth has already come. [10]

Chapter 2.

2.1. Breeding

Plant breeding is a set of methods for creating varieties and hybrids of plants with properties that a person needs, which increase the yield and quality of crops. [2]

Plant breeding results in:

- High productivity;
- Plant nutritional value (e.g. protein content in wheat);
- Improved taste;
- Resistance of crops to weather conditions and diseases and pests;
- Early maturity of fruits;
- Intensity of germination (for example, "responsiveness" to fertilization or watering).

2.2. Breeding Methods

It is commonly known that the main methods are hybridization breeding and artificial selection. These methods are applied simultaneously and mutually complement each other. Hybridization breeding makes it possible to obtain organisms with a certain genotype, and artificial selection allows one to select organisms with certain external characteristics (phenotype) and continue to work on their consolidation. In addition, the grafting method is used in plant breeding. This allows you to artificially combine parts of different plants for further breeding work. The effectiveness of breeding work depends on the diversity of the source material. In plant breeding, this problem can be solved by using various forms of hybridization in combination with artificial mutagenesis. Thanks to the use of the latter and further selection among mutant forms, hundreds of new varieties of wheat, rye, barley, and other cultivated plants were created.

Hybridization Breeding

In plant breeding, various forms of hybridization are used: intraspecific (closely related and unrelated) and interspecific crossing. Such a crossing is considered closely related when the crossed individuals have common close ancestors. This method allows obtaining pure plant lines with a high percentage of homozygosity for most traits. Unrelated crossing is carried out between plants of the same species, but do not have common ancestors. It allows you to combine different qualities of the same species in hybrids. The interspecific crossing is carried out between plants belonging to different species. But quite often interspecific hybrids are sterile. The reason lies in the number of

chromosomes in the karyotype of organisms. But modern science has learned to overcome the sterility of interspecific hybrids. For example, I. V. Michurin used the mediator's method. To overcome the non-interbreeding of the two plant species, he took a third plant, crossed it with the first, and crossed the resulting hybrid with the second plant.

Table 1: Hybridization Types

Hybridization Types			
Intraspecific		Interspecific	Intergeneric
Inbreeding. It is carried out between plant units of the same variety	Outbreeding. It is carried out between varieties of the same species (apple varieties)	(It is carried out between plant units of different species (cherry plum + blackthorn = plum))	(It is carried out between plant units of different genera (rye + wheat = triticale))

Grafting.

One of the classic plant breeding methods is to artificially combine parts of different plants. A part (bud, shoot) of another plant is grafted onto a growing plant (stock). The part of the grafted plant is called the scion. Grafting is not genuine hybridization. It leads only to non-heritable changes in the phenotype of the combined plant, without changing the genotype of the original forms. But grafting contributes to the convergence of the biochemical and physiological processes of the combined plants. The purpose of this method is to enhance the desired phenotype changes as a result of the combination of the properties of the scion and the rootstock (for example, the frost resistance of the northern rootstock and the palatability of the southern varieties of the scion or the resistance of the rootstock against diseases). In addition, new qualities that can be used in further breeding work may appear as a result of grafting. Some varieties of cultivated plants, when propagated by seeds, quickly return to the phenotypes of their ancestral forms, i.e. they "run wild". Therefore, the only way to maintain such varieties is either vegetative propagation or grafting them onto the wilding.

Polyploidy

Polyploidy is the phenomenon of an increase in the number of chromosomes in the nuclei of plant cells.

This is achieved in various ways. If the duplication of chromosomes is not accompanied by cell division, then we can get a diploid germ cell, and then a triploid hybrid. There are also ways to obtain the phenomenon of polyploidy: the fusion of somatic cells or their nuclei; the formation of gametes with an unreduced number of chromosomes due to a violation of meiosis. Genetic scientist G. D. Karpechenko used the method of influencing the spindle apparatus with various mutagens (chemicals, ionizing radiation, critical temperatures) in order to obtain gametes with a diploid set of chromosomes and obtain a tetraploid hybrid. Mutations leading to a multiple decrease in the number of

chromosomes are applied as well. This makes it possible to quickly obtain plant forms homozygous for most genes. [3]

Fig. 1: Types of Polyploidy.

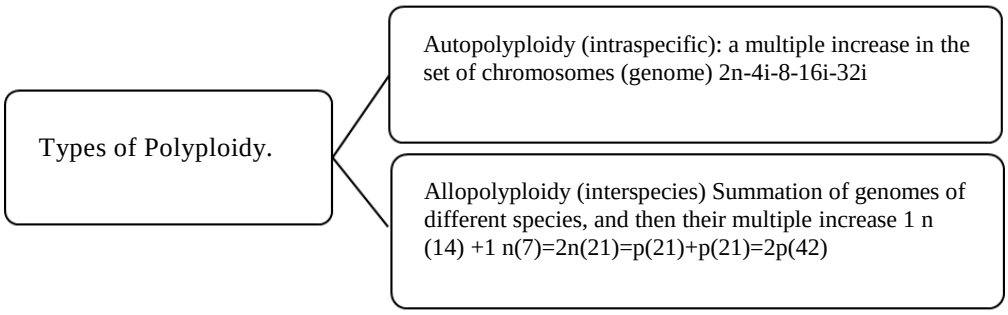


Table 2: Types of hybrids bred by different breeding methods.

Hybrid	**Fruit 1**	**Fruit 2**	**Country**
Pomato	Potato	Tomato	Russia, USA
Pepper tomato	Tomato	Bell pepper	Russia
Auberrod	Tomato	Aubergine	Russia
Dykva	Pumpkin	Melon	Russia
Stomato	Strawberry	Tomato	Great Britain
Tomacco	Tomato	Tobacco	USA
Red Love	Apple	Tomato	Switzerland
Tykvachok	Cocozelle	Pumpkin	Russia
Patichok	Pattypan	Pumpkin	Russia
Kavbuz	Watermelon	Pumpkin	Ukraine
Round cocozelle	Cocozelle	Watermelon	Russia
Ugli	Tangerine	Grapefruit	USA
Pluot	Plum	Apricot	USA
Ogurdynia	Melon	Cucumber	Central Asia
Lemato	Tomato	Lemon	Израиль
Kabakson	Cocozelle	Pattypan	Russia

Chapter 3

3.1. Grafting Pumpkin onto Melon. Theoretical

The root system of a melon ceases to function normally if it gets into poorly heated soil.

In this regard, the successful cultivation of this southern vegetable in the middle and northern latitudes is possible only on raised warm beds, in greenhouses, or on compost heaps.

To make plants more resistant to unfavorable environmental factors, people resort to such a technique as grafting a melon onto a pumpkin.

The Timing of Grafting a Melon onto a Pumpkin

Melon (scion) and pumpkin (rootstock) seeds are sown in the second half of April. To save space, you can plant a pumpkin in one pot, and after 4-5 days - 1-2 melon seeds. One starts to graft on the 10-11th day after germination upon abundant watering. The growth of the graft begins on the 6-8th day. The plants grafted are fed with organic fertilizers or ammonium nitrate solution (1 g / 1 l of water), aired daily. Transplanted into the ground in late May - early June.

Pumpkin varieties for grafting:

- Large-fruited: Volzhskaya Seraya, Lechebnaya, Zimnyaya Sladkaya, Nadezhda, Michurinskaya, Kroshka, Ulybka, Marina from Chioggia.
- Hard-crusted: Altai 47, Golosemyannaya, Spaghetti, Freckle, Danae, Gribovskaya Kustovaya, Dachnaya, Mozoleevskaya.
- Moschatous: Vitaminnaya, Zhemchuzhyna, Muskatnaya, Nectarnaya, Prikubanskaya, Tsukatnaya, Yantarnaya, Vita. [9]

Methods for Grafting a Melon onto a Pumpkin

There are many known methods of grafting a melon tested on many species. The most popular methods for planting a melon among gardeners are considered to be approximation: with a ligule and in the center.

Grafting is performed according to the algorithm as follows:

- The day before the scheduled procedure, the seedlings are generously watered so that their stems have a good turgor.
- The pumpkin seedling is taken out of the pot, trying not to break the integrity of the soil clods. The melon plant is also pulled out of the soil and gently shaken off the dirt from its roots.
- Then they are combined in such a way that the cotyledonous melon leaves are located above the pumpkin cotyledons.
- While holding the plants with the left hand (or carefully fastening them with an elastic band), an incision is made on the pumpkin hypocotyl knee with a sharp razor, moving the blade from top to bottom arrisways. The depth of the cut should not exceed ½ the thickness of the stem (5-7 millimeters on average). A similar incision is left on the stem of a melon seedling, only oriented from bottom to top.
- The resulting ligules of the stock and scion are connected and fixed with a children's hairpin, a small clothespin or a clip. Scotch tape or plaster are not suitable for this purpose.
- The pumpkin is planted in a larger cup with loose, moist soil (the melon root should be above the soil level).

The soil in the container is mulched with raw sawdust with a layer of about 1 centimeter, and a cap from a half of a cut 5-liter bottle is installed on top. Within 5-7 days, under this shelter, you need to maintain a humidity of 90-95% and a temperature of about +25 °C. To do this, it is enough to spray the inner walls of the bottle with water 1-2 times a day. Keep the pot warm and exposed to light, but not in direct sunlight. When the first signs that the scion has taken root appear, the stem of the pumpkin above the grafting area is pinched.

Grafting melon into the center of the pumpkin.

This type of grafting is carried out when the first infused leaf appears on the seedlings. Usually, grafting begin 1-2 days after the melons have come off in the cups. Bottle pumpkin should be sown 3 days after the melon since it develops faster. The process of grafting a melon onto a pumpkin is as follows:

- A glass with seedlings is placed so that the first true leaf is on the opposite side of the performer of the grafting operation. Next, the second real leaf is cut out.
- On the pumpkin, at the point of growth, a downward cut of the stem is made. The cut should be straight and preferably made exactly in the middle of the stem. The length of the cut should not exceed 2 cm. The cut should be symmetrical up to two seed-bearing leaves.
- It is necessary to loosely tie the pumpkin stalk below the cut with plastic tape, so that later you can quickly secure the grafting site.
- The melon is cut at the root. At the same time, the peel is cut from the sides of the seed-long leaves to the same length as the cut on the pumpkin. The stem of the melon should be at least 2.5 cm long and no more than 3 cm long.
- Before placing the melon into the pumpkin cut, it should be opened carefully. The graft is placed on top of the pumpkin cut so that the slices touch.
- In this case, it is necessary to ensure that the pointed tip of the melon comes to the end of the cut. The cotyledons of the melon should be above the cotyledons of the pumpkin, they should be parallel.
- After the graft site is secured with your fingers, the tape that was previously tied below the incision is lifted. When the tape is in the right place, it must be slightly tightened to finally secure the grafting of the melon and pumpkin, a clip is used.

For better growth of the rootstock with the scion, special conditions must be created (increased air humidity). For this, the plant is covered with a cut bottle or glass jar. Every day, the plant must be ventilated, removing the cover for 1-2 minutes. If the grafting is successful, then the plant will begin to grow in 6-8 days.

Care of grafted melon on a pumpkin.

The survival rate of such grafts on pumpkin averages 70-80%. Caring for grafted plants is the same as for ordinary plants, but during watering, do not moisten the graft site with water. Upon completion of the graftings, the plants are watered with warm water and placed in a humid environment. If the number of grafts is small, then you can use ordinary glass jars or fragments of plastic bottles. Otherwise, you will have to arrange a film-covered mini-greenhouse on arcs. In this case, the film should not touch the plants, it is better if it is above them at a distance of about 10-15 cm. Also, with a large number of grafts, special clips should be used to fasten the stock and scion.

Before the grafts grow together, it is necessary to control not only the humidity, but also the temperature (25-30 °C) and protect the plants from direct sunlight with newsprint or covering material in order to prevent them from withering. The grafted plants are watered daily, and the mini-greenhouse is aired for several minutes. If the grafting was successful, the scion growth point begins to move on the 4-5th day. From this moment, the ventilation is intensified and the plants are gradually accustomed to the usual conditions of the greenhouse, and mini-greenhouses are removed in 2-3 days. In the future, the grafted plants are planted in a permanent place and looked after in the usual way. [5]

3.2. Case Studies.

Experiment Description

During the experiment, the average air temperature was:

June 2020 - 22 °C (day), 14 °C (night)

July 2020 - 21 °C (day), 15 °C (night)

August 2020 - 21 °C (day), 13 °C (night)

First, we soaked the seeds in cheesecloth, then sprouts appeared within a week, we planted them in pots with soil thereafter. After 10 days, the melon and pumpkin sprouts were relocated into a greenhouse and open field. After 3 weeks, the melon was grafted onto the pumpkin.

The grafting was carried out as follows:

- An incision was made on the pumpkin's hypocotyl knee with a sharp razor, moving the blade from top to bottom at an acute angle.
- A similar incision was left on the stem of a melon seedling, only oriented from bottom to top.
- The resulting ligules of the stock and scion were connected and secured with a cloth
- We planted the Dykvas in the open ground, as well as in a greenhouse, and covered them with plastic bottles.

Table 3: The dynamics of plant growth and fruit ripening

Parameters/dates	Melon		Pumpkin	Dykva - greenhouse	Dykva - open ground
	greenhouse	open ground			
The beginning of seed germination	05/06/2020			No plants until grafted	
Transplanting	05/16/2020				
Height of sprouts as of 05/21/2020, cm	4	2	10		
Height of sprouts as of 05/29/2020, cm	6	3	15		
Grafting and transplantation of grafted plants has been performed	-			06/06/2020	
Height of sprouts as of 06/13/2020, cm	7.5	5	25	20	20
Emergence of seed-buds	07/22/2020	perished	07/18/2020	07/15/2020	07/20/2020
Emergence of fruits	07/30/2020	-	07/28/2020	07/26/2020	07/30/2020
Harvesting ready-made fruits	09/01/2020	-	09/26/2020	09/06/2020	09/10/2020

As expected, the melon could not grow in the climatic conditions of the Moscow region (in the open field).

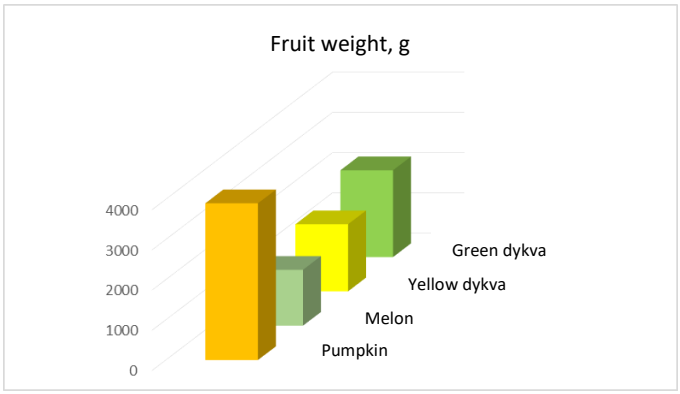
Table 4: Characteristics of experimental fruits

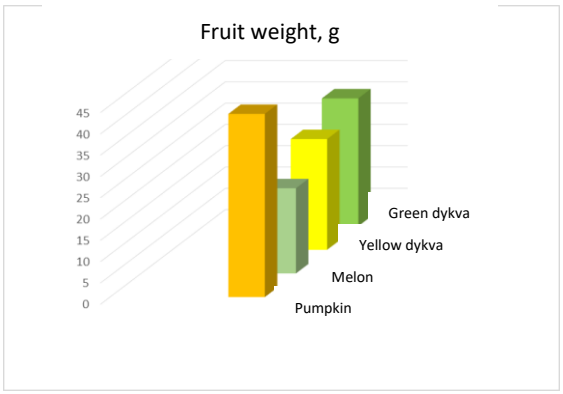
Parameter	Pumpkin	Melon	Yellow Dykva (greenhouse)	Green Dykva (open ground)
Fruit length, cm	43	20	26	30
Fruit width, cm	40	18	23	26
Bark coloration	dark orange	light green	light orange	bright green
Fruit surface	light ribbing	smooth speckled	smooth no mesh	light ribbing
Pulp thickness, cm	3.5	2.0	2.2	3.0
Pulp color	bright yellow	light green	yellow	light yellow
Taste qualities of pulp	pumpkin flavor, crispy, no sweetness	strongly aromatic, soft, sweet	medium melon aroma, crispy, medium sweet	low melon aroma, crispy, slightly sweet
Average weight of seeds in fruit, g	3.5	2.3	2.6	2.7
Harvest date	08/26/2020	09/01/2020	09/06/2020	09/10/2020

The number of fruits per plant	1	1	1	1
Fruit shape	round	round	round	oval
Peel thickness, mm	2.5	1.5	2.1	2.5

From this table, we can conclude that the Dykva growing in the greenhouse has grown larger than the one growing in the open field

Histograms showing fruit weight and size are presented below:





From the histograms we see that the largest fruit has grown in a pumpkin - 43 cm in length, 4300 grams in weight; the smallest one - greenhouse melon of 20 cm in length, 1390 g in weight; yellow (greenhouse) dykva - 26 cm, 1670 g; green (ground) dykva - 30 cm, 2160 g in weight.

3.3. Sensory Analysis

On September 25, 2020, we held a tasting of pumpkins, melons and two dykvas grown by us.

The tasters were students of 8-B grade of the Kapitsa Phystech Lyceum in the amount of 23 people. The guys did not know what kind of fruit (yellow or green) they were tasting. We took a pumpkin with an index of 1 and a melon with an index of 5 as the standard and asked the students to evaluate the samples against the standards. In the table, we deduced the average values relative to the standards (Table 5).

Based on the results of the table, you can see:

- The peel color of the green dykva is closer to the color of the melon, the peel color of the yellow dykva to the color of pumpkin
- The pulp color of the green dykva is closer to the color of the melon
- The aroma of the yellow dykva is more melon-like
- In softness, the yellow dykva is similar to a melon, the green dykva to a pumpkin
- The yellow dykva does not crunch practically, in contrast to the green one
- The yellow dykva is twice as sweet and delicious as the green dykva
- The juiciness of both dykvas is the same. It is something between melon and pumpkin.

Based on the tasting, we concluded that both dykvas are more like a melon than a pumpkin. Having tasted the fruits, the students came to the conclusion that dykvas can be eaten uncooked.

Table 5: Fruit Tasting Results

Parameters	Samples			
	Reference sample 1 (pumpkin)	Reference sample 2 (melon)	Yellow dykva	Green dykva
Peel color	1	5	2	4
Pulp color	1	5	2	4
Aroma	1	5	4	2
Pulp consistency	1	5	4	2
Crunchiness	1	5	4	1
Taste	1	5	4	2
Juiciness	1	5	3	3

3.4. Extraction

In the course of our work, we also carried out an extraction of pumpkin, melon, and green dykvas to determine the concentration of keratin in the grown fruits.

First, we took the same mass of fruits, cut them, and soaked them in a solvent (white spirit) *(Fig. 2)*

Fig. 2:

After 6 days, we took the liquid content of the flasks and dropped it onto filter paper for chromatography. After that, we put the sheet in a container, where we poured the solvent up to the start line of the drops. After 20 minutes, pulling the paper out of the container, and waiting until it dries, we observed the following picture *(Fig. 3)*

Fig. 3:

After carrying out this experiment, it can be concluded that the pigment of the dykva is brighter than that of the melon, but paler than the pumpkin. Consequently, the concentration of carotenoids in dykva is closer to pumpkin.

Findings

We believe that the objectives of our study have been achieved. The harvest of dykva grown in the open field and in the greenhouse is obtained.

In practice, we checked that:

- It is impossible to grow a melon in the open field in the climate of the Moscow region (the plant died)
- By grafting a heat-loving melon to a resistant pumpkin, a hybrid close to melon in taste and aroma but resistant to the climate of the Midland can be grown. A melon grafted onto a pumpkin safely tolerates a temperature drop of up to 16 °C, while a melon at such a temperature slows down or dies.
- Like pumpkin, dykva has a developed root system, tolerates drought, and has good immunity.
- In the greenhouse, the dykva sets and ripens earlier than in the open field
- By its appearance, dykva looks more like a pumpkin, but the taste and aroma of melon prevails

Thus, we carried out a series of pumpkin graftings onto a melon, assessed the survival rate of grafted samples, compared the growth of samples in a greenhouse and in an open field, and made a comparative characteristic of experimental fruits. We carried out a tasting of the harvest, made jam from dykva, studied the content of carotenoids in dykva.

We believe that in the Moscow region it is possible to grow heat-loving vegetables and fruits with their correct hybridization, care, and selection of varieties for grafting. That is, our initial assumptions about the possible development of this direction on an industrial scale can be confirmed by conducting more massive experiments over several years.

List of Used Literature

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