



Industrial Features of Punica Granatum L. in Azerbaijan Conditions

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Abstract

Vegetation of pomegranates begins with vegetative buds blooming in the first half of April. Time of vegetation duration is about 230-235 days in different species.

There are revealed in the study works of the biological characteristics of subtropical fruits, that each breed in the process of formation of a crop has its main critical periods, the most responsible for the effective implementation of their potential productivity in the real harvest. The major role in the formation of new Pomegranate growth has played one and two-year branches, which appears near in 90% of all shoots. The bases of the harvests are long pistils of flowers that make up 10-20% of the total number of flowers on the bushes.

Keywords: Punica granatum L., ecology, productivity, environment, development

Material and Methods

There are added direct experimental researches on augmented desk and literary works of analysis, organizations and synthesis of all previously accumulated literary materials, observations on meteorology, phenology for all crops in order to compare and derive sufficient reliable and permanent perennial theoretical positions on the biological cycles of phenology with temperature relations in regime and their edaphic growth. This kind of methods gives us opportunity to specifically control the rules of adaptation of plants in relations with the evolution of their adaptation to the ecological analogues of varying degrees of similarity. There are determined the validity of the soil-climatic and ecological characteristics of the studied subtropical fruit crops in accordance with its biological requirements to a variety of microclimatic conditions of Absheron and Shirvan zones of Azerbaijan, also ensured the successful growing of a pomegranates with the recommendations to their productivities.

Subtropical fruiting in Azerbaijan has evolved in a very favorable dry subtropical zone condition, covering the whole territory of the Kura-Araz lowland, the whole territory of Absheron Peninsula, foothill areas of the Small Caucasus, semi-humid subtropical zone, foothills of the Greater Caucasus, as well as the territory of humid subtropical zones of Lenkoran-Astara. There has been since olden time's cultivated olives, pomegranates, figs, and jujubes, Japanese persimmons, nut species (almonds, pistachios, walnuts, hazelnuts, chestnuts, and pecans), pineapple guava, citrus and others.

Ecological nature of the major subtropical crops (olive, pomegranate, almond and pistachio) is still less studied. But the harvest is a complex product of the interaction of natural and economic factors, which reflects not only in the influence of the biological properties of plants, but also in the weather, climate and other conditions of the ecological environment. Climate affects to the plant not only directly, but it has an impact on soil formation and microbiological processes, it favors or it prevents the spread of pests and diseases, it is also less susceptible to artificial effects than other environmental factors having biological importance.

The Experimental Part

Soil is a vital and limited resource. Although it indefinitely can provide biological productivity (production of organic matter and mineralization of dead plant residues), but it can quickly lose its natural potential, its fertility. The development of these actions will allow specific technical skills and it aims to intervene in the livelihoods of fruit trees, specifically to manage its growth and development, to ensure the durability of plants.

The purpose of this work is the creation of a scientific basis subtropical fruit cultivation technology based on the study of rules of development of organisms, depending on the origins, ages and variety of properties, as well as ways to increase productivity, durability and longevity of agronomic problems. The studies were conducted at the Azerbaijan Scientific-Research Institute of Horticulture and Subtropical Crops in accordance with the thematically plans. Development of subtropical crops is substantially depended on soil and climatic conditions and necessarily for the cultivation of heat-loving crops. Subtropical zone occupies an intermediate position between the tropical and temperate regions, characterized by an abundance of heat, moisture and long frost-free periods. With subtropics always associated ideas of lush southern nature, warm sea and exotic subtropical vegetation. Unique flavor for these places are created palms, cypresses, magnolias, oleanders, here are ripen magical fruit lemons and olive trees, eucalyptus trees, there are blooming and fruiting Japanese persimmons. But their significance are not limited, they are much wider. Subtropical agriculture provides population with high-quality teas, citrus fruits, flowers and laurels, nuts, hazelnuts and other nut crops, medicinal, technical and spice plants. Fruits of subtropical plants have high tastes, dietary and medicinal properties; they are containing large amounts of easily digestible sugars, vitamins, minerals and organic acids. To the subtropical fruit crops growing in the dry subtropical zones of the Azerbaijan Republic are applied included having great economic importance olives, pomegranates, almonds and promising the cultural perspectives pistachio. Pomegranate refers to the heat-loving plants. They need the vegetation period in 180-220 days, and the sum of active temperatures not less than 3000⁰C -3200⁰C for fruit ripening. Pomegranate bush is small according to a large heat-loving and frost

resistance. Even in short-term lowering of the temperature to $-14-15^{\circ}\text{C}$ are damaged only the top of one-yearling growth, and partially are died buds. Frosts in $-16-17^{\circ}\text{C}$ are damaged skeletal branches, in meantime of frosts in $-18-20^{\circ}\text{C}$ pomegranate bushes are lose all aerial parts. The root system of a pomegranate in the areas of its cultivation has never suffered from winter lows. Pomegranate species have different species to different frost resistances. Thus, within the *Punica granatum* subspecies *Porphyocarpa* B.R., which include most of the cultivated species, *Punica granatum* species *cinereicolla* B.R. pomegranate species suffer of frost in 1.5 or 2 much time less than *Punica granatum* species *rubrucolla* B.R. Pomegranate is very unpretentious to soil conditions. The slate and the detrital scree, rock crevices, alluvial fans of Mountain Rivers and streams, the coastal dunes are a common habitant of wild pomegranate. Phenological stages of growth and development of pomegranate in Shirvan area.

In Apsheron Peninsula condition in the assessment of Phenological data on the growth and development of pomegranate plants have been seen spring Phenophases and ripening later compared with the terms of their vegetation in Shirvan area or in the foothills of the Small Caucasus, which indicating higher levels of daily temperatures in the later time. In the Republic conditions has been shown in the horizontal gradient of delay in flowering when moving from east to west are close to 3-4 days by 1° longitude, and vertical is equal to 2-3 days for every 100 m per height.

In central regions of the subtropical zones in Shirvan group of regions have passing Phenophases of pomegranate as follows. Depending on weather conditions in the first year and the beginning of the second decade of April there is a massive growth in blooming buds. A few days later there are revealed the first young leaves of anthocyanin pigmentation color, which are replaced about two weeks later by the green color. It is preserved only in young leaves growing at shoot tops.

Shoots growth begins with the appearance of the first leaves and has continued until autumn. Their greatest growth has observed in the second half of April on early May, and then during the mass flowering has dramatically reduced, and after flowering, only small parts of the shoots have continued to grow in length. The main mass of the annual growth of pomegranates have been formed in the first period of growth both of in quantity and in length of shoots from April to June. The relative intensity in the formation of new growth is observed during the first month of life in 55-70% of the shoot average length, which has gained a maximum growth at the second half of the life month, at a later and therefore, the full attainment are observed during the warmer weather time. Continued and equal measured growth of shoots are starting to observe at a higher level of heat supplying, there are observed adaptation of plants by the thermal resources which allow in a long growing season to grow in warm zones, and in thermal seasons they don't differ so dramatically as in cooler natural areas where they are survived better and preserved plant shoots, but the second period of pomegranate growth are observed more intensive in growth of shoots and also can be observed in many or single shoots and they can be short or can be delayed until late autumn.

The first flowers have begun to blossom at the first or at the second decade of May: at first have appeared long pistil flowers, which have two waves of flowering (large and small); they are separated by a period time of 15-20 days. At this time, the mass flowering has occurred in short pistil flowers. The differences between the peaks of flowering of different types of flowers does not cause to significant interruptions in the general flowering of shrubs. Mass flowering of both types of flowers occurs in the second half of June. During this time has faded to 90-95% of flowers appeared on bushes. A small number of flowers have appeared until late autumn, which are produced by the young bushes in large quantities.

Since august month growing pomegranates are begun to gain the variety in color, which has reached full expression in ripe fruits. The most fruits of varieties are ripening in October. At this time there has begun phase of "yellowing leaves", which takes place rapidly in the first half of November. The mass leaf fall has characterized by the transition of the plants state to winter dormancy, usually has taken place in the second half of November, sometimes has captured on early December.

There are differences in the pass of Phenophases by varieties of pomegranate species, especially differences are observed in *Punica granatum cinereicolla* B.R. species (in King Pomegranate and in Kazake species) and in *Punica granatum rubruolla* B.R. species (in Red peel species, in red Guleysha species and in Bala Mursal species). The buds have begun to appear in *Punica granatum rubrucolla* B.R. species later than other species near after the 3-4 days. The first buds appear early on a most of species in *Punica granatum* species *cinereicolla* B.R. species. Mass budding on these species has begun on earlier in average after 4-7 days and flowering has begun in average of 4-5 days with the greatest difference between species in 9-10 days. However, it should be noted that the typical pomegranate long flowering season are continued up to 50 days or more, the observed difference in the timing is not critical in the selection of species for planting trees.

Difference between the pass of the phases of development in different species of pomegranates depending on temperature conditions are researched by our scholars. Depending on the species and timing of the pass of Phenophases, the average temperature and the time of buds appearing are shown on $13^{\circ}\text{C}-13,4^{\circ}\text{C}$ warm, mass flowering are appeared on $25^{\circ}\text{C}-25,6^{\circ}\text{C}$ warm, yellowing of leaves and leaf fall are appeared on $13,1-13,8^{\circ}\text{C}$, $-9^{\circ}\text{C}-9,8^{\circ}\text{C}$. We can see from researches the average temperature at the beginning of buds and leaf yellowing, of phases are fluctuating between the average in $13-14^{\circ}\text{C}$ on external view evidence of the beginning and at the end of active plant growth of pomegranates. For leaf fall phase are characteristic the temperature limits in $9-10^{\circ}\text{C}$ of reflecting the introduction of plants on the state of hibernation.

Depending on the species duration times from the bud until flowering consist of 77-82 days to yellowing leaves is 202-205, until to leaf fall consist of 230-235 days, and duration of the growing in vegetation seasons are same in many various pomegranate species.

As it carried out of the sum of effective temperatures above 10°C , it does not depend directly on the duration of the period of buds - the beginning of flowering and its daily average temperatures. For example, the period for pomegranate species of Bala Mursal is in 32 days and an average daily temperature is $18,4^{\circ}\text{C}$, sum of effective

temperatures consists of 264⁰C. The same amount of temperatures is observed 261⁰C for a period of 38 days with daily average temperature 16,9⁰C. Same examples can be given for other species with different duration of the periods. Thus, the required amount of effective temperatures can accumulate over a different number of days with different amounts of active temperatures. In convenient years duration interphase of buds to flowering, usually has shortened due to the accelerated development of flowers at a favorable temperature conditions. The conditions of fruits and fruit developments will improve in the early stages of life. Elongation of the noticed interphase periods, especially in the later stages of flowering are caused in particular lack of heat, usually leads to a weakening of fruiting. The duration of the beginning of flowering is yellowing of leaves slightly and has no effects on the yield of pomegranates. Leaf fall and winter dormancy in Pomgranates are not organically inherent properties of the species, since pomegranate plants are wintering in the greenhouses with a sufficiently of high temperatures, don't shed off their leaves and become virtually evergreen. Evergreen forms of pomegranates are well known in Florida, in Reunion Islands, in the southern regions of China. Thus, leaf fall for Pomgranates and winter rest are temporarily, they are forced circumstances, the presence of them are caused by unfavorable environmental conditions and in top all of them are stood low autumn-winter temperatures. Therefor mild temperature of Shirvan climate zones is favorable for the development of Pomegranates. Unpretentiousness of Pomegranate to soil conditions are observed as well as by the proliferation of its cultural spaces. The pomegranate is cultivated on limestone of Absheron peninsula of Azerbaijan and in acidic red soil river regions of Adjaria. Therefor are accessible for growing of pomegranate culture the middle salty soil land of southwestern Turkmenistan, heavy loam of floodplains in southern part of Uzbekistan and all are well aerated, permeable gravels of the Fergana Valley. The better soil for pomegranate gardens are characterized deep, rich with organic substances in loamy soil of forest origins, with a slight of waterproof subsoil. Heavy salty soil is unsuitable for pomegranate orchards or moor soil. However a pomegranate is salt resistant compared with other fruit crops; it grows and develops in satisfactorily saline irrigation water at a salinity of about 0.3%, and also in a heavy loam soil with salt contents of 0.87%. All subtropical fruit crops are required for their growth and development a certain amount of nutrients. So they grow developed and bear better fruits at fairly deeply fertile soils, and they are also gradually turning into accessible in roots for penetration of nutrition throw cemented subsoil horizons or from layers of waterproof clays.

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