

Graphical reconstruction of the Timurids era gardens based on works of miniature painting and archaeological researches

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ABSTRACT: This article is devoted to acquaintance with the gardens of the Amir Timur and the Timurids era that existed in Central Asia in the XIV-XV centuries. These magnificent gardens are preserved only in the descriptions of medieval scholars, miniature paintings and archaeological materials.

KEY WORDS: gardens of Amir Timur, gardens of the Timurids, gardens of the Timurids in miniature, Charbagh garden.

I.INTRODUCTION

Bagh-e Dolat-Abad has been graphically recreated based on the archaeological records by I.A. Sukharev, U. Alimova, A.S. Uralova, some written sources and works of miniature. Referring to the sources, the garden was small, the palace itself could be two-story, with an iwan, located on a hill surrounded by a water channel (Fig. 1).



Fig 1. Architectural and art reconstruction of image of the garden "Dolat-Abad" of Gilmanova N.

Bagh-e Dolat-Abad Garden, located south of Samarkand, was built upon the return of Amir Timur from the Indian campaign in 1399. Describing the Dolat-Abad Garden, from which only architectural fragments of the foundation of the magnificent palace on a hill were preserved, Clavijo stated: "Clay rampart surrounded the garden. The hill the palace stood on was surrounded by a deep moat full of water, as a large stream constantly falls into it". "There were 6 pools in the garden that were connected by paths with planted trees on both sides." [12, p. 244]. According to archaeological data by I.A. Sukharev, fragments of the wall surrounding the garden and some forms of irrigation ditches and pools were discovered in 1935. Further, I.A. Sukharev discovered that there was an irrigation ditch, fed from the Abbos canal, in the center of the garden. I.A. Sukharev found 4 pools out of 6 mentioned by Clavijo. One 28 x 62 m in the northern part of the garden, the other three 25 x 25, 25 x 25, 32 x 32 m in the southern. In the southern part of the garden there is a 12 m height quadrangular hill. The size of the upper area of the hill is 40 x 40 m and the area is strewn with fragments of ceramics and architectural decor, mosaics, majolica. [18, p. 5]. In addition to the pools, the palace itself was surrounded by more than 20 m wide moat, which, along with aesthetic features and the creation of a microclimate, carried out the defense function.

According to the studies by U. Alimov, Bagh-e Dolat-Abad had 900 x 1350 m rectangular shape, stretched from the southwest to the northeast, and consisted of two parts: the southwestern half (900 x 900 m) was actually Charbagh itself with a palace and northeastern (900 x 450 m) was a fruit garden and a vineyard. The preserved part of the park's wall (30 x 80 cm high) is constructed of blocks. The remains of the foundation (70 x 80 cm) evidence that the building had a rectangular plan, the perimeter which was 20 x 14 m. Based on the remains of the decor, this was the building of the palace itself [6, p. 34].

Relying on miniature works, the works of medieval scholars, archaeological records, archival materials, an artistically - graphic recreation of the architectural grandeur of the palace and Dilkusha garden was made (Fig. 2).



Fig. 2 Architectural and art reconstruction of image of the garden "Dilkusha" of Gilmanova N.

According to the research by M.E. Masson, Bagh-e Dilkusha Garden was formed as a result of merging 12 small pre-existed Samarkand gardens [2, p.150].

Receptions of ambassadors, meetings with the royal guests, magnificent wedding ceremonies and festive celebrations were held in the Dilkusha suburban Palace.

Based on I.A. Sukharev's research in 1935 – 1936, it became possible to identify the approximate size and layout of the building (palace). The building was rectangular - 74 meters long and 40 meters wide.

The archaeological research by U. Alimov uncovered that the garden was almost square in shape and had four entrances along the axis of the facades. In the southwestern side there was the main entrance, in the northeastern side – the additional one. It was located east of the city in the Hancharbagh district, built by the order of Amir Timur in 1397 - 1399 years (799 year) in the Kani-gil valley for his young wife TukulKhanum [3, p. 134].

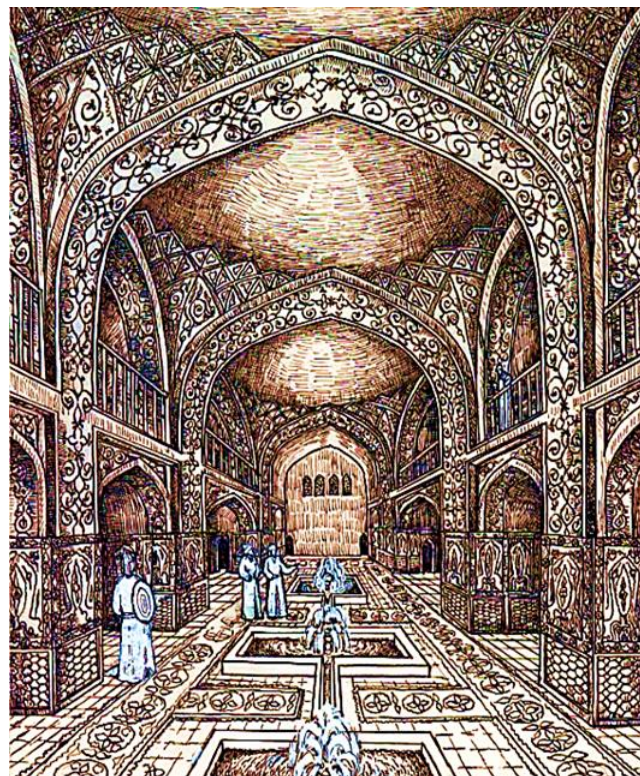
Bagh-e Dilkusha, according to Sharif al-Din 'Ali Yazdi, had a square plan measuring 1,500 x 1,500 guzs or 900 x 900 m. The layout, apparently, had four parts with a palace in the center of the courtyard.

U. Alimov discovered traces of three quadrangular fountains measuring 5 x 5 in the center and two 4 x 4 on the sides, as well as many fragments of ceramic pipes with a diameter of 19 cm.

In 1404, in Bagh-e Dilkusha Amir Timur hosted the Castilian king's embassy, led by Ruy Gonzalez de Clavijo.

Being admired by the beautiful garden, Clavijo described: "On the outskirts of the beautiful Kani-gil valley, Amir Timur ordered to set up a garden, the beauty of which would surpass all other gardens previously created in his empire. They laid one and a half thousand guzs square foundation to one side and in the middle of each of them arranged high entrances. The vaulted plafonds of the palace were decorated with stucco and mosaic decorations, and the surrounding walls were covered with lining on a kashin basis (sand, clay, glue). In four corners of the garden tall pavilions, decorated with tiles of wonderful colors, were erected. The garden was broken by symmetric alleys into square stalls and small garden plots of various shapes" [12]. It follows from Clavijo's records that wall paintings representing scenes of the Indian campaign of Amir Timur were used to decorate the palace. Sculptures of elephants were in the courtyard and in the third part of the palace there stood a golden throne, where the ruler received guests. Plane trees and apples were planted behind the palace.

The construction itself is very attractive from the point of view of its artistic decor and the subtleties of its execution. It can be assumed that in the era of Amir Timur it could have been designed as a palace in the luxurious Dilkusha garden.



Based on the scientific works of G.A. Pugachenkova and archaeological records of U. Alimov, Charbagh gardens of the Timurid era were modeled by Professor D.A. Nazilov [19]. He modeled the inner two-story interior of the Dilkusha Palace, where we can see all the beauty and luxury of the palace structure with a number of beating fountains, located in the center of the palace and giving a cool air on hot, sultry days. The hall of the palace is presented as an enfilade of two-story iwans, with luxurious decor of geometric and floral ornaments (Fig. 3).

The garden with pools and fountains inside the Ak-Saray Palace (the residence of Amir Timur in Shakhrisabz) had a traditional layout as other Amir Timur's suburban palaces near Samarkand and corresponded to the structure of Charbagh gardens.

Referring to written sources, miniature paintings, materials of archaeological research by Kh.T. Sultanov, it was attempted to recreate the appearance of the former splendor of the Ak-Saray Palace. It is one of the hypotheses that makes our imagination conceive and imagine the grandeur of the scale of such a magnificent building of the XIV- XV centuries of the Amir Timur era.

Fig 3. Architectural and art reconstruction of image of the interior palace of "Dilkusha" of Nozilov D.

The Ak-Saray Palace has been modeled in a three-dimensional image with a facade, the palace's internal structures, a garden, fountains, arbours and various types of trees (Fig. 5).



Fig. 5 Architectural and art reconstruction of image of the palace of “Ak-Saray” of Gilmanova N.

There is a legend telling of a wonderful howz, allegedly arranged at the top of the Ak-Saray Palace. The howz was supplied with water through ceramic pipes (popularly referred to as “kobur”) from the Takhta-Karachamountains and then plunged down an artificial waterfall [21, p. 45].

However, there is no scientific literature confirming this fact, but given the scope and scale of the construction of Amir Timur’s structures, it can be assumed that such irrigation systems for supplying water had existed. Water could be supplied to pools or small reservoirs located at a lower level from water sources. It is not excluded that water mills (the saqias) were widely used to supply water from the main source.

During archaeological excavations, Kh.T. Sultanov discovered traces of irrigation systems and many ceramic pipes. Water could be supplied to small fountains with flowing water, for gardens located on the upper floors of the ruler’s chambers, where the royal wives lived, because in hot climates, water and vegetation created a certain microclimate.

Given the size of the portal of the Ak-Saray Palace, water could not rise to such a height directly from the mountains, since the pressure, when water was supplied from the mountain pass, would simply burst the ceramic pipes at high altitude. It can be assumed that the water coming from the Hissor Range was accumulated in the lower water reservoir, and then with the help of water-lifting mechanisms set in motion by animal power, it was supplied to the top, from where it went down through the pipes under pressure and was distributed to the lower fountains on the territory of the palace. Consequently, in the chambers of the ruler and his wives there could be gardens with fountains and vegetation. Mechanisms for water supply, driven by bulls, and information about them can be found in the works of medieval miniatures and scientific studies [22, p. 258 - 271].

At that time, the residence of Amir Timur, the magnificent palace of his vast empire, was the embodiment of all the innovative achievements and technologies ever created in this era. Being the ruler of a huge and rich power, he paid particular attention to the irrigation system and could afford such an attractive luxury as using fountains and pools in his chambers, especially since the method of supplying water to the top had been known long before the Amir Timur era. This is evidenced by the medieval scholars’ works, collected in the libraries of the ruler and widely used by scholars of the Timurids era of the XIV-XV centuries.

In the XII - XIII centuries, scientists of the East possessed such knowledge and with the help of mechanical devices could not only raise water to any height, but also use water distribution systems to break them down into pools and fountains.

In the XII century, the engineer, mathematician and astronomer of the Islamic Golden Age, Ismail Al-Jazari, invented many mechanical devices. He designed valve pumps, water-lifting mechanisms, fountains and water clock, which are now the prototypes of modern mechanisms used to this day.

The “Book of Knowledge of Ingenious Mechanical Devices” by Al-Jazari was popular in those days, as it was released in many copies and described the mechanisms that Al-Jazari constructed himself. Some of mechanisms were based on the earlier works of the Banu Musa brothers, who were famous for designing fountains. All the information about mechanical devices with their detailed drawings was found in miniature painting works.



Based on the miniatures of medieval authors, mechanisms for supplying water to the top (approximately 20 to 25 m high), such as a water tower arranged in a hollow wall that could be used in the gardens and palace structures of the Timurids era, have been graphically modeled. In miniature paintings we can get to know water supply mechanisms set in motion by animal power (Fig. 6).

The results of an archaeological research of the Dilkusha Garden carried out by U. Alimov evidence that water could be supplied to the upper floors, small gardens and fountains [6]. U. Alimov discovered a similar “T” shaped hollow wall, built opposite the entrance of the country palace, which could be designed to supply water to the ruler’s country gardens, using special mechanical devices placed in it and set in motion by oxen.

Fig. 6 Architectural and art reconstruction of a tower for supplying water for fountains of Gilmanova N.

II. SIGNIFICANCE OF THE SYSTEM

The magnificent appearance of the gardens of the Timurids era is preserved in the descriptions of medieval scholars and miniature paintings of the XIV-XVII centuries. The results of scientific studies and archaeological researches, as well

as works of chroniclers and poets of that time give us a visual representation of the beauty and the great aesthetics of the landscape gardening layout of the Timurids era in Central Asia.

Ancient works of miniature painting contain rich scientific and source materials about the gardens of the Timurid era. The gardens were harmonious and were designed to create paradise on Earth, architectural structures and landscape smoothly merged into them.

Miniatures give us information about the structure of gardens, types of trees and decorative plantings, various forms of water pools and fountains, types

of garden pavilions and tents, the sophistication of artistic decor in decorating the interior, floors, wood carvings, marble and many other details of the architectural appearance of gardens of the Timurid era.

III. LITERATURE SURVEY

*The architect who built such a palace,
He provided for everything and calculated everything*
AlisherNavoi

In the poem "Farhad and Shirin" the great poet of the East, AlisherNavoi, had glorified the palaces and park buildings of the Timurids era for centuries.

In his poems the poet described the process of preparation, construction works, engineers and craftsmen, completion of construction works, selection

of appropriate building materials and tools, interior painting, careful selection of color paints for each building and feast scenes in four majestic palaces, built in accordance with four seasons by the ruler of China for his son Farhad.

In the poem "Seven Planets", the poet tells about seven gardens and seven palaces, each of which differed from each other in color: black, gold, green, blue, red, sandalwood, camphor (Fig. 8).

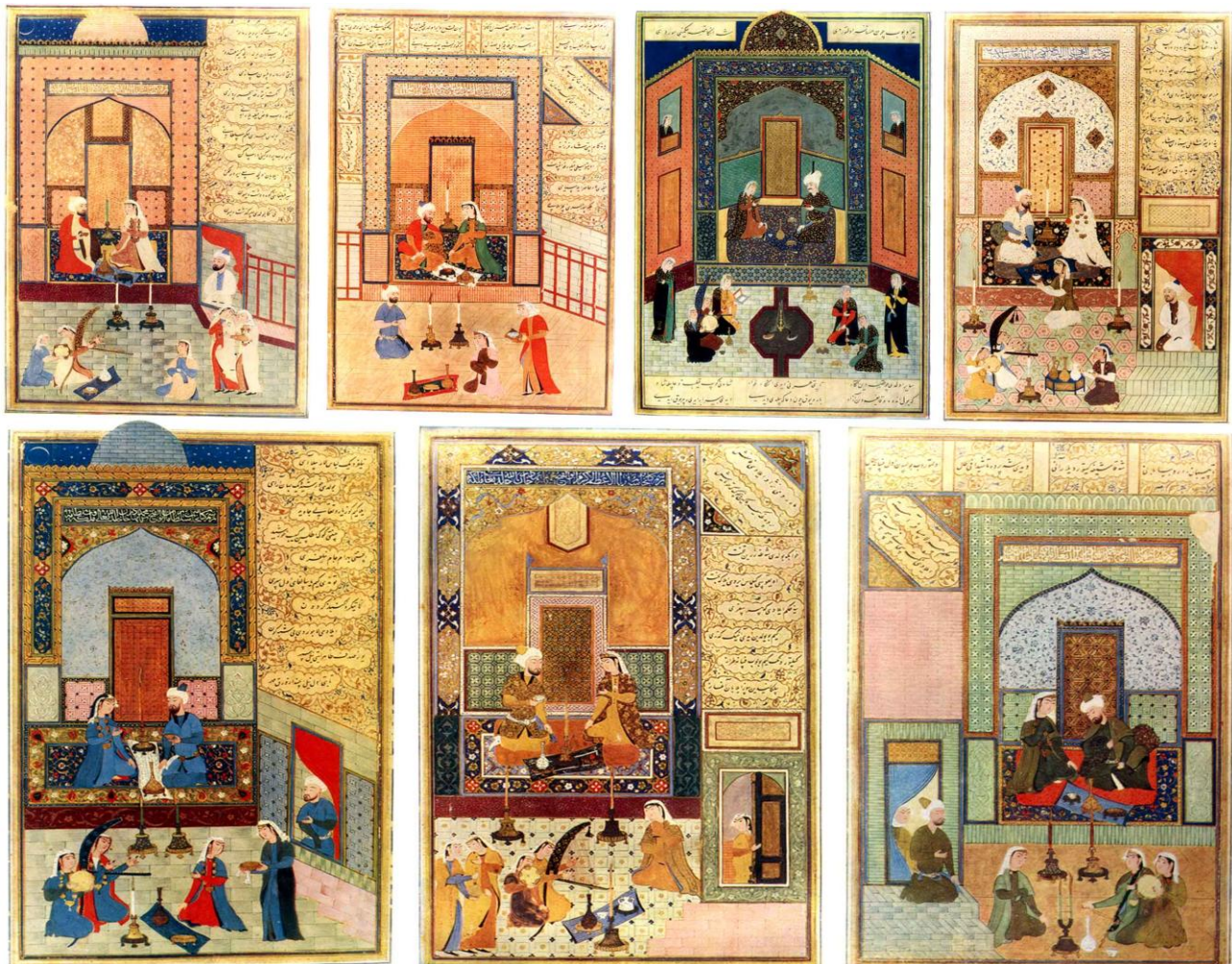


Fig. 8 Miniatures for the poem of AlisherNavoi "Seven Planets"

Together with the poet, we seem to appear in the period of construction of palaces of the Amir Timur era, we observe and feel all the grandeur, power, beauty of the external and internal decoration of each palace, pavilion, garden erected by the architects.

Amir Timur attached great importance to suburban landscape gardening with luxurious palaces inside, which reached their peak in the Timurids era. Unfortunately, with the fall of the Timurid Empire, suburban gardens fell into disrepair, buildings and decoration materials were dismantled by the local residents. None of those gardens and palaces have preserved to this day.

The gardens of Amir Timur, constructed in the suburban areas of Samarkand, Heart and Shakhrisabz, were especially magnificent. An evidence of that are the art decoration artifacts, which were found during archaeological excavations at the sites of alleged gardens near Samarkand, in the form of painted tiles covered with glaze, mosaics, majolica, glazed terracotta with floral and geometric ornaments made by skilled craftsmen of the Timurid era. These artifacts evidence the fact that very luxurious and richly decorated country residences of Amir Timur were located in that area.

Large in size (1000 x 1000 m. on average) gardens competed with each other for the beauty of green spaces, the diversity of fountains, the wealth of palaces, pavilions and tents. In addition, the gardens that encircled the city of Samarkand from all sides and served for recreation and entertainment purposes, at the same time, in cases of necessity, could serve as fortifications, since many of them were surrounded by defensive walls with towers and moats filled with water and had drawbridges. If necessary, solidly built palaces in the gardens could serve as defensive constructions, whereas the towers on the four sides of the walls surrounding the garden would serve as observation posts.

Detailed information and descriptions of suburban gardens of the XIV and XV centuries near Samarkand were given by Ruy Gonzalez de Clavijo, historians and chroniclers Sharif al-Din 'Ali Yazdi, Abdarrazzak Samarkandi, Zahir-ud-din Muhammad Babur and Alisher Navoi.

The Memoirs of Babur (well known as the "Baburnama") and miniatures to them give us valuable information about Samarkand gardens of Amir Timur, Ulugh Beg. The gardens were also built in Andizhan, Shakhrisabz, Herat, Kabul, Hindustan and other places.

After the crusade to Samarkand in 1497–1498, Zahir-ud-din Muhammad Babur described the city with an emphasis on the gardens: "There are many palaces and gardens that belonged to Timur and Ulugh Beg, both in Samarkand and the suburbs ... To the east of Samarkand there are two gardens. The one which is more distant is called – Bagh-e Boldi (or the Perfect Garden); the nearer □ Bagh-e Dilkusha (or the Heart-delighting Garden). From Bagh-e Dilkusha to the Firozeh gates there is Khiaban (or public avenue), planted on each side with pipe-trees. In the garden of Dilkusha, there has also been built a large palace, in which a series of paintings represented the wars of Timurbek in Hindustan. " [1, p. 44–47].

According to the contents of the Memoirs of Babur and miniature works, it is clear that the layout of the gardens was very popular in the territory of all Timurid states. That tradition had later been continued by Babur himself in Afghanistan and Hindustan.

The scientists like V.V. Bartold, V.L. Vyatkin, A.Yu. Yakubovsky, I.A. Sukharev, M.E. Masson, G.A. Pugachenkova, U. Alimov A.S. Uralov, D.A. Nazilov, M.A. Yusupova, S.N. Sadykova, Emma Clark wrote about the garden art of the Timurids era in their scientific works.

G.A. Pugachenkova [1] in her scientific work "Landscape Art of Central Asia in the Timur and Timurid era" described and analyzed the gardens of the Timurid era and their architectural traditions; gave an approximate plan for the reconstruction of a typical Charbagh; sketched the structure of the gardens in accordance with the miniature works of the XV–XVI centuries. In conclusion, she fairly assumed that the Charbagh had become a leading principle in the garden art of Central Asia due to its absolute compositionally symmetrical construction, which was very convenient in the local, mainly flat terrain of Samarkand.

The knowledge on the medieval gardens in the suburbs of Samarkand expanded due to archaeological research by U.A. Alimov [3] in 1967–68, which was aimed to identify the locations, names, planning principles and the architects of the gardens. In his works U.A. Alimov also modeled and expressed some considerations regarding the architectural style of the gardens.

As a result of archaeological excavations by Utkir Alimov, traces of the foundations of Bagh-e Dilkusha, Bagh-e Boldi, Bagh-e Dolat-Abad were discovered. The fragments of ceramic pipes for irrigation, small fragments of fountains, ceramic tiles, fragments of interior decoration and the exterior of the palace have been found too. Multi-storey buildings and parks are now located in their places.

According to scientists and archaeologists, the names of 12 gardens of Amir Timur and 4 gardens of Ulugh Beg in the suburbs of Samarkand were known.

U. Alimov claimed that there were two types of gardens:

1. Charbagh gardens. These gardens were usually built in convenient places and were surrounded by walls in the form of a fortress. Charbagh gardens had alleys, various trees like poplars and plane trees, plants and other beautiful decorative and fruit trees, which gave shade and coolness.

2. Parks. The territory of parks was usually covered with natural green thickets, fed by water flowing from the mountains and hills. Parks were convenient for rest and hunting. They were large in size and had free layouts. Trade relations with many neighboring countries led to the emergence of new species of fruit trees and flowers in Samarkand. The gardens were adorned by animals and birds; decorative fish and ducks swam in howz.

There were interconnected arbors and tents in the gardens. Between the paths there were flower beds, fountains, lined with stones, with a flowing and, less often, jet spurting upwards.

According to Ruy Gonzalez de Clavijo, the tents were made of silk and multi-colored carpets, stretched on ropes, covered with scarlet red velvet and other fabrics with silver medallions or patterned appliques on top. Their design included plot compositions, embroidered gilded figures of eagles or falcons.

A variety of pavilions and their forms in the gardens of Amir Timur, gave a garden an unusual look and beauty. "A garden pavilion was usually square, standing on 4 thin racks, with a flat ceiling and a curly ledge, sometimes crowned with a turret."

The best craftsmen took part in the breakdown and construction of suburban gardens and parks with palace structures. For example, Pir Ahmad got the nickname of "usta of Bagh-e Shamaliy" after he designed the palace in Bagh-e Shamal. Despite the fact that the gardens of XIV-XV centuries no longer exist and there is not much information about them, in written sources of that era, works of medieval miniature painting, poems by AlisherNavoi, archaeological research, archival materials, not only scientific information, but also a visual representation of the garden art of the Timurids era are presented.

Collected data allowed recreating the picture of garden art of the Timurid era.

It is determined that the gardens were mainly located in the east and north-east of Samarkand and those gardens were given poetic names: Bagh-e Boldi, Bagh-e Dilkusha, Bagh-e Chinar, Bagh-e Amir-zade-Shahrukh, Bagh-e Maidan, Bagh-e Baland, three gardens of Bagh-e Shamal, Bagh-e Nau. Two other gardens were located to the west: Bagh-e Dolat-Abad, Bagh-e Jahan-Numa – to the south.

When building suburban parks of the XIV - XV centuries, gardeners paid special attention to locations, the presence of water sources on sites, the microrelief of the area, etc.

In the XIV - XV centuries there were a lot of greenery, gardens and meadows around Samarkand. Foothills were convenient for rest and hunting as there were greeneries and small rivers. These territories were tidied up, paths were laid and flowerbeds were laid out there. Since the territories of foothills remained to natural conditions, such gardens were large in size and asymmetric. Many animals and birds inhabited there, and for that reason foothills territories were used for royal hunts.

Charbagh gardens were usually divided into 4 parts and include such gardens as: Bagh-e Boldi, Bagh-e Dilkusha, Bagh-e Dolat-Abad, Bagh-e Shamal, Bagh-e Behesht, Bagh-e Amir-zade-Shahrukh, Bagh-e Nau, Bagh-e Baland. The second type of gardens (parks) includes: Bagh-e Jahan-Numa, Bagh-e Maidan, Bagh-e Nakshi-Jahan, Bagh-e Chinar.

One of the main conditions for planning a suburban garden was the availability of water on a territory for further irrigation. Usually, new canals were dug and the old ones were cleaned and repaired before every construction.

According to Babur, the Dargom canal, withdrawn from the Kukhak (Zarafshan) river, flowed 2 km south of Samarkand [1, p. 63]. Gardens and surrounding villages were supplied with water from this canal. Gardens located to the north of the city were irrigated by the waters of the Obirahmat canal (Bagh-e Baland, Bagh-e Maidan, Nakshi-Jahan) [4, p. 284 - 285]. Gardens in the south and south-east of the city were irrigated by the waters of the Abbas and Karaunas canals [4, p. 284]. One of these canals irrigated Bagh-e Dolat-Abad [5, p. 5].

Pools in gardens were sometimes located on the same axis, interconnected by alleys, lined with trees on both sides. They were indispensable elements in the garden design. Pools created a micro climate in gardens and were used for waterfowl [6, p. 42]. The ditches around the walls of a garden were filled with water, which was used as an additional source for irrigation.

Fountains were also indispensable elements in garden art and most often they were located on the territory of palaces. During archaeological research, the remains of three fountains located on the same axis in the central part of the palace were found in Bagh-e Dilkusha. All fountains were quadrangular-shaped, one of them was 5 x 5 m in size, the other two - 4 x 4 m each. All the fountains were interconnected by ceramic pipes.

The remains of the fountains were found in the Chinnikhon garden. One of the fountains had a bowl in the form of an octahedron - a favorite form in the ornament of that time. The second fountain, located 50 m away from the first, had a round bowl with a diameter of 1 meter [7]. Images of such fountains of various shapes can be found in miniatures to "Khamsa" by Nizami [8, p. 96, 128, 238] and the poems by AlisherNavoi [9, p. 293 - 294].

In his works Sharif al-Din 'Ali Yazdi mentioned that various fruit trees grew in the gardens of Samarkand: apple trees, apricot trees, peach trees, plum trees, mulberry trees, pomegranate trees, pear trees and walnut trees. He also mentioned

about grape varieties. [10, p. 293 - 294]. Of the trees, the most common ones were poplar trees, chinara trees and others. Roses, irises, daffodils, tulips, jasmine, lilies adorned the suburban gardens of Samarkand in the XIV - XV centuries [11, p. 53 - 54].

The flowers were planted in a certain order: some bloomed, others faded, there were rows of flowers with smell and rows of flowers with no smell. Apparently, skilled gardeners and florists worked in gardens, however, their names are still unknown. Combination of ornamental and fruit trees was a typical part of garden art at that time [2].

Animals and birds made gardens look even more beautiful. Deer (fallow deer), pheasants and peacocks were all around, decorative fish and ducks swam in the houses. [12, p. 245]. There was a zoo with many animals in Bagh-e Behesht [13, p. 231].

All these attributes in a complex were an integral part of each garden and created a special appearance in their landscape.

Palace buildings located in gardens, according to compositional principles, can be divided into two types.

The first type includes palaces in Bagh-e Dolat-Abad, Bagh-e Chinara, Bagh-e Behesht, Bagh-e Amir-zade-Shahrukh, Bagh-e Nakshi-Jehan, Bagh-e Baland, Bagh-e Jahan-Numa and in Bagche (Chinni Khan). They were not very large in size, single-story and had an iwan only from the main facade, built on a high platform.

The second type includes palaces in Bagh-e Dilkusha, Bagh-e Boldi, Bagh-e Shamal, Bagh-e Nau, Bagh-e Maidan (ChehelSotoun). To make them look massive, these types of palace buildings were built on level ground, occupied a large area, hadiwans on 3 or 4 sides. The palaces in them were surrounded by moats and had an appearance of fortified buildings. Their other feature was a cruciform layout, which was typical in architecture style in Central Asia [15, p. 33].

Gardens, where the suburban palaces were built, were usually walled, had entrances on all sides, from which the alleys led to the palace; main gates were usually facing the city [16].

Burnt bricks of a square shape (25 x 25 x 6 cm in size) were the main building materials. For laying a base bricks of larger sizes (26 - 28 x 26 - 28 x 6 - 7 cm) were used, 24 x 24 x 4 cm bricks were used for flooring. Being auxiliary materials, wood, ganch (ganch – material similar to gypsum building plaster) and marble were used to make finishing plates for flooring and base and other purposes, in particular, for the manufacture of columns. In summer residences, located in suburban gardens, wooden columns with richly carved ornaments were often used. Special attention was paid to decorating wooden doors with carvings. Colored window glass inserted into ganch grates - panjars were used in the interior of palaces [16].

The interior of palaces was decorated with art painting using the kundal technique. Their plots were diverse. According to Ahmad ibn Arabshah, the murals of the palace halls depicted scenes of battles, sieges, reception of ambassadors, receiving gifts, feasts. [17, p. 82]. During excavations, fragments of painted stucco were found. These fragments are believed to be the parts of interior decor and facade decor [16].

In the internal and external decoration of the walls a geometric ornament, combined with floral motifs, was widely used. A significant place was occupied by the decoration of suburban palaces with epigraphy, which was found on glazed mosaic murals and marble slabs.

Mosaic murals were composed of separate glazed tiles and parts of floral motifs and, combined with geometric patterns, the murals made interesting compositions, which were used to decorate panels, entrance portals and facades. The mosaic sets were intensive with a combination of blue, yellow, white and green tones. Gilding was also often used. The sets were commonly in traditional motifs - multi-beam stars, five, six, octagonal, multi-petal rosettes [16].

Murals with floral and geometric ornaments were composed of majolica panels. Majolica was used to clad stalactites, which filled squinches using white and bluish-green colors. In the XIV century, majolica murals sometimes filled the entire surface of the walls both from the outside and in the interiors. The size of the tiles, the murals were made of, was 53 x 29 cm, sometimes they were dark green in color with gilding. Gilding was used both for painting tiles and for highlighting individual elements of a composition. People lived those days had reported that the walls of the palaces from afar seemed decorated with bright carpets [16].

By the end of the XV century some gardens with light palace constructions had completely vanished. Babur noted that in his time only the name remained from Bagh-e Nakshi-Jahan Garden [1, p. 64]. Only a few gardens had been preserved until the end of the XVI century, but had lost their former charm to a large extent. In written sources of the XVI - XVII centuries the gardens were hardly mentioned. By the beginning of the XX century from many of them only the foundations remained [16].

IV. METHODOLOGY

While studying the structure of gardens and palaces of the Timurid era, it was discovered that the law of the "golden ratio" [20] was taken into account in the compositional layout of traditional Charbagh gardens [20] to highlight the palace. Then, according to the same law of the "golden ratio", green spaces and fountains were positioned (Fig. 7).

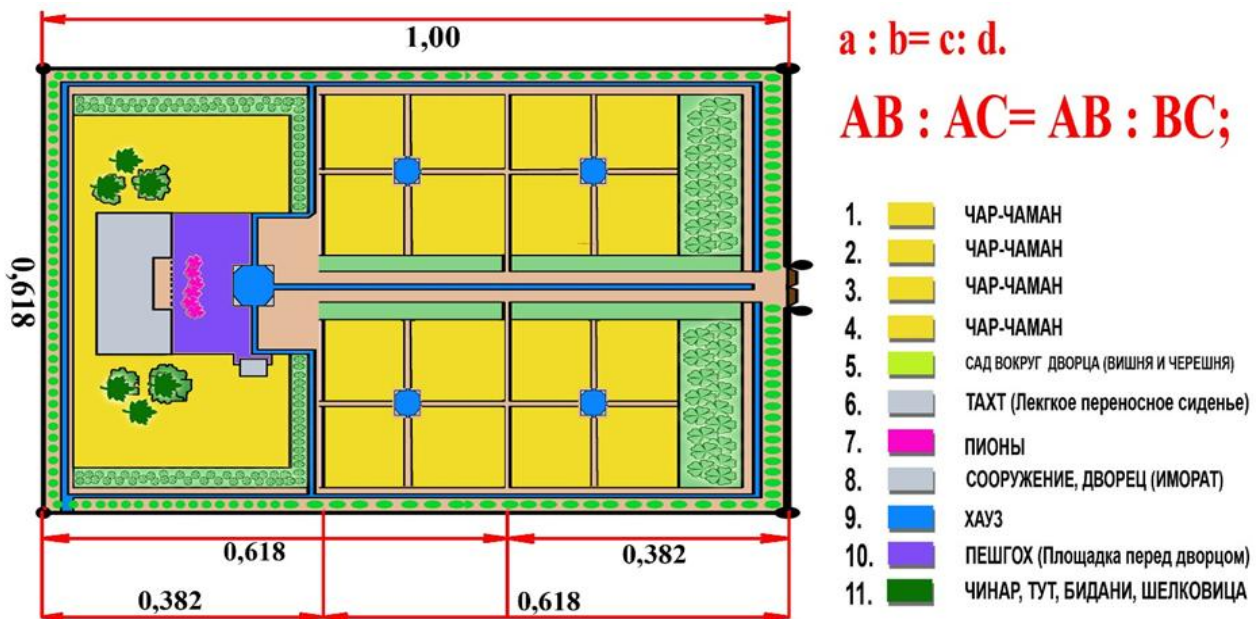


Fig. 7 of Gilmanova N.

Decorative, woody and shrubby vegetation, small architectural forms and other volumetric elements of garden and landscape design were placed in certain proportions, which, if correctly positioned, strengthened the artistic expressiveness and harmony of garden facilities, allowing the visitor to easily determine the center of a garden.

V. EXPERIMENTAL RESULTS

Medieval masters took into account the symmetry of a garden plan, its location with respect to the central axis. The main compositional principles of Charbagh gardens were the following: square or rectangle shape of a garden; presence of a central axis in the form of an alley; breakdown of the two main sectors into additional alleys (so called "char-chamans") - quadrangular platforms, which were planted with various decorative trees and flowers. Such was the order in the construction of the medieval oriental garden, which was harmonious in its proportions.

These conclusions are very valuable and important while considering the "golden ratio" law, practiced in structuring garden buildings of the Timurids era.

The harmonious eastern paradise (Firdaus) of the Timurids era garden art was reflected in the works of medieval scientists, thinkers, poets and artists.

VI. CONCLUSION AND FUTURE WORK

Having reached the peak under the rule of Amir Timur, the Timurids' gardens had a huge impact on the development of garden art not only in the East, but also in European countries. The canons of an ideal Charbagh garden developed by the XV century were traditionally continued by the Baburid Dynasty in Kabul and India in the XVI - XVIII centuries.



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