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## The chrysanthemum collection in the National Botanical Garden of Iran

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Fig. 1 View of the western Alborz mountains to the north

The National Botanical Garden of Iran (NBGI) was founded in 1968. The site is located on a relatively flat plain, sloping gently to the south, on the south side of the Alborz mountain range. This range dominates the skyline to the north of the region, which includes the Capital Tehran (fig. 1). An area of approximately 150 hectares was allocated to the garden, which is on the north side of the main highway linking Tehran with the nearby city of Karaj to the west. The average elevation is 1320m above mean sea level.

The main aims of the garden are to encourage and engage in the conservation

of native plant species, to conduct research on botany and horticulture, and to increase public awareness of nature and conservation.

Creation of the garden followed an ambitious design including large-scale landscaping, which was undertaken to shape the local topography and provide diverse plant habitats. Hills, valleys, lakes, rock outcrops and other features were created. Six lakes were excavated and filled with water. Three elongated hills (the highest reaching 19m above the plain level) were built to represent the Alborz and Zagros Mountains (the two

principal mountain chains of Iran), and the Himalayas. Two large rock gardens with cliffs and waterfalls were created.

The garden is arranged around perpendicular axes dividing the entire garden into four quarters, radiating out from a central circle containing many varieties of shrub and climbing roses (fig. 2). There are 22 different plant collections, representing Iranian and exotic habitats and vegetation types, and some general collections.

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Fig. 2 Plan of the NBGI

Aside from a herbarium of native Iranian plant species, there are collections representing China and Japan, the Americas and Europe, as well as educational areas demonstrating domestic planting options. We have also established a seed bank in the garden, conforming to international standards, including refrigeration to 5°C and -18°C. It now contains approximately 40,000 seed specimens, belonging to 4,000 native Iranian plant species.

Creating such a garden in an arid climate was always going to require supplementary water, so we established a water supply via six deep wells. Depending on the water requirements of each plant collection, sprinklers or drip irrigation are used (fig. 3). Recent years of drought, likely to be linked with climate change, as well as the demands of domestic and commercial development around us, have put some stress upon the aquifers which provide our water supply.

The garden is open to the public, and many social events including educational programmes and annual festivals are presented. We have a spring festival with a show of tulips, and in the autumn there is the chrysanthemum show.

Chrysanthemums are perennials in the Asteraceae family; most species originate from East Asia, and the centre of diversity is in China. The main habitat of most modern



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Fig. 3 Drip irrigation used in the chrysanthemum display

chrysanthemums is China, with many originating from *Chrysanthemum indicum* and *C. morifolium*.

There are three main forms of chrysanthemum:

1. Disbudded chrysanthemum: a relatively tall, firm stem, ending in one flower.

2. Spray: a medium-sized flowering stem ending in a few flowers.

3. Pompon: a short plant with many flowers.

In an ongoing research project at the Ornamental Plant Research Centre (OPRC) in Mahalat, Iran, hybridisation of different



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Fig. 4 *Chrysanthemum morifolium* 'Kimia'



Fig. 5 *Chrysanthemum morifolium* 'Shahrnaz'



Fig. 6 *Chrysanthemum morifolium* 'Oran'

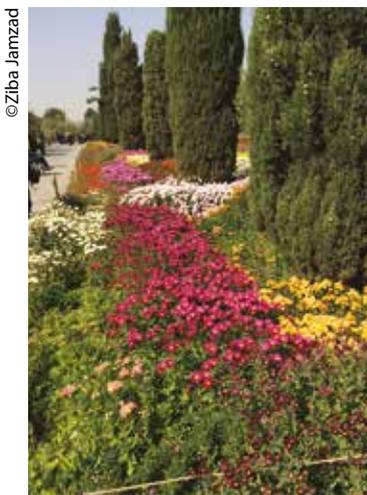


Fig. 7 Southern edge of display, with *Cupressus sempervirens*

chrysanthemum types has been carried out since 2001, to create diversity and new hybrids. This has resulted in the creation of approximately 850 different chrysanthemums, in an array of colour, height and flower form (figs 4-6). These new hybrids have been submitted for evaluation and registration by The International Union for the Protection of New Varieties of Plants (UPOV).

In autumn 2016, in a collaborative programme between the NBI and

the OPRC, the products of this chrysanthemum project (mainly of the pompon and spray groups) were planted out in a designated space in the garden with an area of 6,000m<sup>2</sup>. This is a sunny, exposed site close to the centre of the garden, bordered to the south by an avenue lined with *Cupressus sempervirens*, and with a view of the Alborz Mountains to the north (figs 7 & 8). One of the largest chrysanthemum displays in the world, it is an international tourist attraction, drawing visitors from near and far.

The area has been designed with many paths for the visitors to explore and see the flowers from up close. The arrangement of flower colours was designed to provide complementary and contrasting effects (figs 9 & 10).

Soil preparation included adding some compost and manure to the natural sandy soil of the garden. The small, rooted cuttings were planted in early spring and irrigated by drip irrigation. The new growth was trimmed twice before the flowering period in autumn. A chemical fertiliser containing the required macro- and micro-elements was applied before flowering time.

In our region the flowering period starts in mid-October and continues until late November, depending on the type of chrysanthemum.



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Fig. 8 View north from display area

After flowering, the dried flower heads are cut off to prevent seeding. To keep the original colour combinations, new seedlings must be eliminated, so careful weeding is required each subsequent spring.

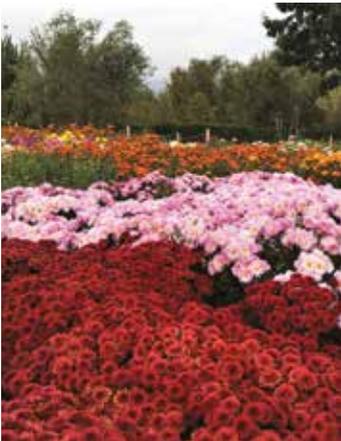


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Fig. 9

The chrysanthemum collection in the garden is a wonderful display of colours, accompanying the other autumn foliage colours. It is one of the attractions that bring many visitors to the garden, who enjoy the experience of

being among so many flowers (fig. 11). Our statistics indicate that in autumn 2019 we hosted 45,000 visitors, including groups of students, tourists, public and private institutions, families, friends, gardeners and growers. 🌼



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Fig. 10



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Fig. 11 Visitors of all ages enjoying the garden

**Dr Ziba Jamzad** is head of the Botany Research Division of the Research Institute of Forests and Rangelands (RIFR), from where the NBGI is directed and supervised. She designed the landscape of the chrysanthemum collection in the garden, and directs its on-going maintenance. Dr Adel Jalili is the director of RIFR and head of the garden project, and Dr MR Shafiei is the chrysanthemum breeder.