

A close-up photograph of several vibrant pink orchid flowers in bloom, arranged in a curved line across the upper half of the frame. The background is a soft, out-of-focus green, suggesting foliage. The lighting is bright, highlighting the delicate petals and the central crests of the flowers.

KIMILSUNGIA

— AROMA OF FLOWER SYMBOLIC
OF A GREAT MAN IS EVERLASTING —

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OF A GREAT MAN IS EVERLASTING –

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FLOWERS GREET



THE FLOWERS BLOWN IN THE BOGORU BOTANICAL GARDEN

President Kim Il Sung, head of the Democratic People's Republic of Korea, paid an official visit to Indonesia in April of Juche 54 (1965).

According to schedule, he, accompanied by President Sukarno, visited the Bogoru Botanical Garden on April 13. The garden with an area of 85 hectares has an open-air botanical garden planted with 10,000 kinds of tropical plants and a greenhouse. It was built in 1817 and is noted in the world for its grandness and beauty. It is also called a "flower garden of Indonesia". The botanical garden was flanked by the Bogoru Palace in the wide garden of which were grazing many deers.

After making a round of the open-air botanical garden, President Kim Il Sung visited the greenhouse in the central part of the garden. In the greenhouse there were 80,000 tropical orchids of 2,000 varieties, over 200 varieties of banana, fantastic cactuses and many other tropical plants.

After looking at the various kinds of flowers, he stopped his step in front of clusters of unusually beautiful flowers of orchids. They bore violet flowers blown successively on drooping flower stalks which came out of the articulated stems like a bamboo.

They were flowers with specific southern flavour. After he looked at the flowers for a while, he said that they were very beautiful. Stepping forward, the director of the botanical garden told to the President that it was a new variety bred by an Indonesian florist and that it was the first flower blown on the instructions of



President Kim Il Sung, accompanied by President Sukarno, visiting the Bogor Botanical Garden on April 13, Juche 54 (1965)

President Sukarno.

“Oh, is that so? It is nice of you to show me fine flowers.” He expressed his thanks.

Then Sukarno said, “I am going to call the flower Kimilsungia.”

“I have done nothing extraordinary. There is no need to name a flower after me, I think.”

“No, Your respected Excellency has already rendered enormous services to mankind. So you deserve a high honour.”

Then enthusiastic applause and cheers arose from the suite and welcoming people, and children’s chorus began to sing the *Song of General Kim Il Sung*.

Thus a new variety of flower named after the great man came into the world.

Leaving the botanical garden, President Sukarno said to the director of the garden, “Since this flower has been bred with much care to present to the distinguished guest, its cultivating technique should be completed as soon as possible.”

Kimilsungia



IN PYONGYANG AFTER TEN YEARS

Ten years had passed since then. One January day in Juche 64 (1975) Kimilsungia arrived in Pyongyang.

Informed of the arrival of the flower, Comrade Kim Jong Il looked at the flower, putting aside the work he was doing. He looked at the two flowering plants for a while before he said, "These are Kimilsungia. These are the flowers which the leader admired ten years ago and said they were very beautiful. The petals had white markings in their lower part like these. Kimilsungia is said to bloom beautifully for 100 days."

He asked the officials surrounding him what impression they got from the flowers they must be seeing first. He said that they were immortal flowers blown beautifully by the adherents of the Juche idea and stressed the need to raise the flower and make a flower basket with them to be presented to the father leader.

He looked out through the window for a while and then said that seeing again Kimilsungia in the homeland he was reminded of happenings in Indonesia ten years ago like yesterday's.

When President Kim Il Sung's visit to Indonesia was reported officially, welcome preparations were made vigorously in the capital and provinces of this country.

One day President Sukarno acquainted himself with the progress of welcome preparations. The chairman of the welcome preparation committee reported him on the programme of the function, show places, guesthouse and others.

After hearing him out, the President concluded, “His Excellency Kim Il Sung is creating a world’s model in building an independent sovereign state. I am going to make a policy speech in the People’s Consultative Conference (National Assembly) in his presence. Ceremonies of awarding him the highest order of Indonesia and the title of honorary doctor should be held in specific and unusually grand style. Let us fix the guesthouse now under construction for his lodging and make His Excellency Kim Il Sung stay there as the first guest. The Bogoru Botanical Garden should show the guest a new variety flower never known in the world”.

So a new task was imposed on Sujanagasan, the director of the botanical garden.

On the morning of April 15, Juche 64 (1975), President Kim Il Sung received a meaningful flower basket on the occasion of his 63rd birthday. Seeing the basket of Kimilsungia he looked back on the happenings ten years ago with deep emotions, saying, “The flowers are beautiful. These are very fine flowers.”

Like in those days in Bogoru Botanical Garden, the full-blown flowers greeted not the guest yesterday but the host today.

Kimilsungia Greenhouse in the Central Botanical Garden



A “BEAUTY IN THE TROPICAL FOREST”

The florist who bred Kimilsungia was German-Indonesian Bunt. He was a known florist of Indonesia who had produced many varieties of flowers. Most of them were orchids. He thought that orchids were the most beautiful flowers from which the ideal flower could be bred. After several years' persistent efforts to produce a new variety, he succeeded in breeding another fantastic flower in spring of 1964.

One January day in 1965 Bunt entered the office of director of the botanical garden on his call. The director invited him to sit down and said, “Have you heard of the coming official visit of the head of the Democratic People's Republic of Korea? We are to show him our botanical garden and do you have any good idea?”

After a little thought, Bunt proposed to show him a new variety of orchids he had recently produced. This was the *Dendrobium moniliforme* belonging to the orchid family which they admired as a “beauty in the tropical forest”.

Soon after Kimilsungia came into the world, Sujanagasan and Bunt unexpectedly had to leave the botanical garden. Sujanagasan came to work in an outlying island and lost contact with Bunt. As a result, Kimilsungia could not be widely known to the world.

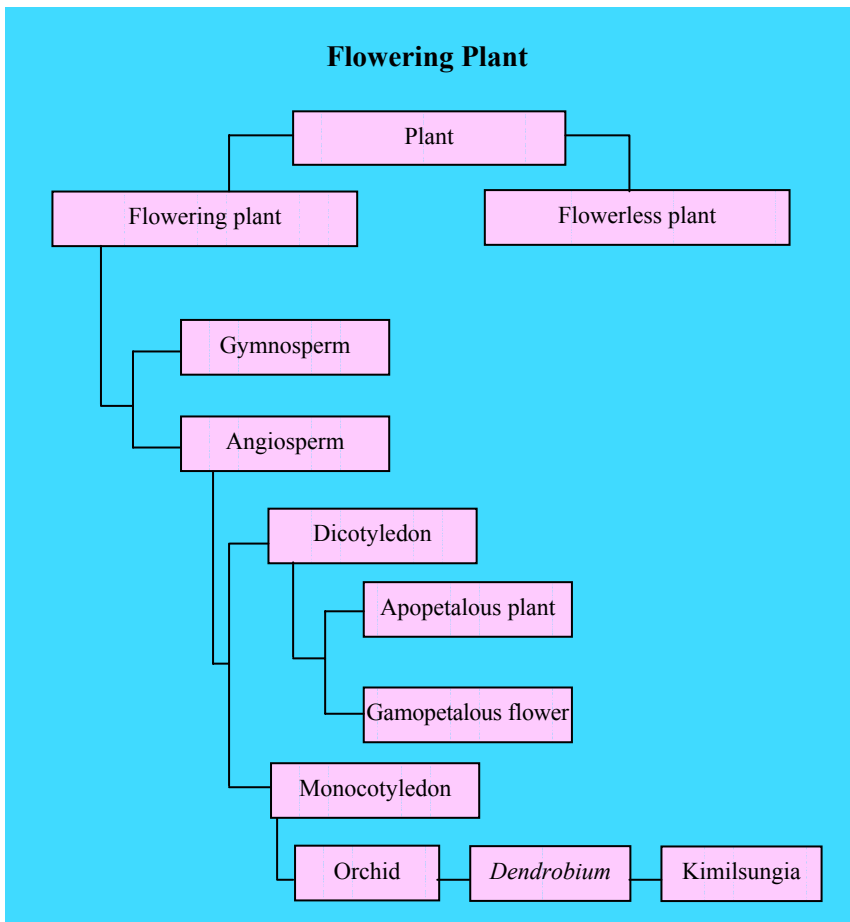
After some years he returned to his home in Bogoru, but he was sick in bed, on the verge of his death.

He wrote in his will:

“...I am sorry to die without realizing my desire to make Kimilsungia flourish and bloom beautifully in Korea. However, I am sure that it will thrive and bloom beautifully in Korea.”

His will was conveyed to Bunt by his son.

Deeply moved, Bunt finally succeeded in breeding Kimilsungia and sent it to Pyongyang.



THE FLOWER FASCINATES ALL

On the occasion of the 87th birthday of President Kim Il Sung, the First Kimilsungia Show was successfully held in Pyongyang.

The show at which about 2,000 flowers were displayed made a great impression on the onlookers. The number of visitors amounted to 260,000.

In response to the desire of the Korean people and progressive mankind who boundlessly revered President Kim Il Sung, the show was converted into a historic flower festival which showed the acme of beauty of Kimilsungia shining as the flower of the age.

The First Kimilsungia Show was held in grand style in Pyongyang



Opening the show, the chairman of Korean Kimilsungia Federation said that he was sure that the show would glorify the immortal revolutionary achievements of President Kim Il Sung, greatly encourage our people making vigorous strides in building a powerful and prosperous socialist country and give immense pleasure to the progressive mankind advancing toward a new independent world.

In his congratulatory speech, Maruzky Usman, Minister of Tourism and Art and Culture of the Republic of Indonesia, reminded the attendants of the historic visit which the respected President Kim Il Sung paid in 1965, together with General Kim Jong Il.

The university in his country had awarded him the title of honorary doctor, which was an expression of boundless reverence for him, he said. During his stay President Kim Il Sung visited the Bogoru Botanical Garden in which there was a nameless variety of orchids bred by a florist, which President Sukarno named Kimilsungia out of his infinite reverence for and trust in President Kim Il Sung, he stressed. He said that the Indonesian people take pride in the fact that the two plants of Kimilsungia have now multiplied to several ten



thousand plants, and expressed his hope that more and nicer Kimilsungia would be exhibited in the future show.

The show was prolonged two days beyond the schedule in response to the unanimous desire of the people in the capital and provinces, overseas Koreans and many foreigners who wanted to visit it.

At the closing ceremony, citations were awarded.

At the closing speech, the chairman of the federation mentioned that the show added colour to the public holiday and greatly encouraged our people and People's Army men in their struggle to follow up the "arduous march" with a march to a paradise.

He emphasized that the entire Party members, working people and People's Army men should complete the method of cultivating and multiplying Kimilsungia technically and scientifically and propagate it widely, following the noble intention of the respected General Kim Jong Il who said that Kimilsungia is a revolutionary flower which makes our people have a national pride in living and making revolution in the homeland of Juche with the great leader at helm and reaffirm their readiness to dedicate



themselves for the completion of the revolutionary cause of Juche and that Kimilsungia should be propagated widely and handed over to posterity.

Visitors greatly admired Kimilsungia on display. Some of them put down their impressions in the visitors' book as follows:

O Ik Je, the deputy chairman of the Committee for the Peaceful Reunification of the Fatherland – I think that beauty is the crystallization of the highest ideal and value which man pursues. So everything great in human society is beautiful and things that are not beautiful cannot be great.

President Kim Il Sung, an unparalleled great man, created a large harmonious society of the era of independence under the rays of Juche and opened a new history of human love. To extol his great-

THE FLOWER PARTICULARLY BELOVED BY THE PRESIDENT

President Kim Il Sung very much loved flowers.

He particularly loved magnolia among them.

One day of May in Juche 53 (1964) the President, who visited the Central Botanical Garden in the suburbs of the capital, watched the snow-white flowers of magnolia blown with specific fragrance on its outstretched branches. The flower smacks of greatness and the flowering plant is sturdy, evocative of the mettle of the Korean people and deserves of being made a boast of in the world, he said.

Today magnolia thrives bearing beautiful flowers in all parts of Korea, noted as the national flower symbolizing the national character and spirit of the Korean people.





Florists and flower fanciers of different countries visiting the show hall

ness the flower which came into the world crystallizing the acme of beauty was named after the great President. It was quite right. Such an event was never known in floral history. Kimilsungia is the pride of our 70 million nation and progressive mankind and the flower of the independent age.

Flowers require utmost care and sincere efforts of florists. There is a saying that a beautiful flower presupposes utmost care of a florist.

I want to say that the show hall filled with Kimilsungia presented an imposing display of the loyalty and filial piety of all to the President.

A representative of the mission in Pyongyang of the National Democratic Front of South Korea – During visit to the show hall praised by all, I was greatly moved, reminded of President Kim Il Sung, who showed the way of life and struggle to our south Korean revolutionaries and showed infinite benevolence to us. I keenly feel intense loyalty and filial piety of the north Korean brethren who take boundless honour and pride in being the Kim Il Sung nation and tend the immortal flower with utmost care.

Indeed, Kimilsungia is the immortal flower symbolizing the sun,

the great man which gives vital energy of Juche not only to the northern brethren but also to the south Korean people who are fighting for independence, democracy and national reunification, and to the world's people.

Hans Wauer, vice-chairman of the Central Committee of the German Communist Party – Kimilsungia attracting people is a pleasure and pride for the Korean and the world's people. The flower evokes infinite reverence for Comrade Kim Il Sung and unforgettable memory of him among people.

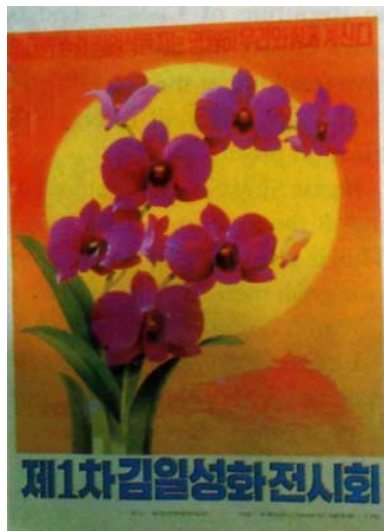
I am sure that Kimilsungia will always be full-blown not only in Korea but throughout the world and remind mankind of the life and achievements of the great Comrade Kim Il Sung.

M. Dalaifu, chief of the political department of the leadership council of the People's Revolutionary Party of Mongolia – Flower is a symbol of beauty. Beauty of this lively full-blown flower lies not only in its shape and colour, but in the symbolization of worship for the great man that other flowers cannot be symbolic of. Kimilsungia gives the impression of simplicity and calm while Kimjongilia gives the impression of strength, ardour and bravery. Looking at them, I



am reminded of the personality and character of these great men.

Alberto Moredo, General Secretary of the Central Committee of the Communist Party of Peru (Red Fatherland) – Looking at the full-blown Kimilsungia, I am convinced that the august name of Comrade Kim Il Sung and his great exploits will remain in the hearts of the Korean people and mankind for ever together with the flower.



Sissawat Siribut Panara, state secretary of Ministry of Culture and Art of Cambodia – Looking at these full-blown flowers, I keenly feel how deeply the Korean people revere the great President Kim Il Sung.

Valeri Gaba, people's artiste of the Russian Federation – Looking at these flowers, I come to feel deeply how high the authority and prestige of President Kim Il Sung are. Reverence for a great man is never evoked by force. Breeding of this flower in Indonesia shows how great President Kim Il Sung is.

Buhary Ependy, ambassador of the Republic of Indonesia – Kimilsungia is a flower symbolising friendship and solidarity of Indonesia and Korea. This is a pride of Indonesia.

Bassang Alhaju Foussein, charge d'affaires of the Syrian Arab Republic – I deem it a great honour to visit the Kimilsungia show. I pay my reverent respect to the respected Comrade Kim Il Sung.

President Kim Il Sung who created the immortal Juche idea will remain for ever in the hearts of people as the brilliant sun illuminating the road for mankind to follow.

Kamkeng Sainyakaeu, ambassador of the People's Democratic

Republic of Laos – The beautifully full-blown Kimilsungias show clearly the high regard of the Korean people and the progressive mankind of the world for President Kim Il Sung.

Through this visit I keenly felt the greatness of his exploits and his high prestige.

Jagzit Sing Shatra, ambassador of the Republic of India – Looking at the beautiful Kimilsungias, I cannot hold back admiration. This is a fascinating scene which can be seen only in Korea having two great men.

Wan Yongxiang, ambassador of the People's Republic of China – I express my admiration at the Kimilsungia show held on in a specific manner on the occasion of the birthday of President Kim Il Sung.

PROSPEROUS METASEQUOIA

Metasequoia is the tree known again to the world whereas it was believed that it once widely spread in the northern hemisphere and then perished and remained only as a fossil.

In Juche 39 (1950), Yang Yong, Commander of the Chinese People's Volunteer Army who participated in the sacred fatherland liberation war of the Korean people, presented this plant to President Kim Il Sung, the Supreme Commander of the Korean People's Army.

President Kim Il Sung transplanted it to his garden from the flowerpot and cultivated it in person and saw to it that it was planted in all parts of the country.

In our age this valuable Metasequoia which occurred again as the "surviving fossil plant" has multiplied innumerable. It now flourishes, anticipating the bright future of the prosperous Korea.



FLOWERS BLOOM BEAUTIFULLY



YOU ARE ORCHID, *DENDROBIUM*

Orchids have been widely known as beautiful and rare flowers from olden times and are loved by people. There goes a saying, “Be lovely as orchids or be tough as a bamboo”. Orchids are known as a symbol of beauty.

Many names of Korean females bear “ran” (orchid). Such are Ran, Miran, Aeran and Okran. The orchid family comprises a large number of species. Their species are estimated to amount to 20,000-35,000. Although chrysanthemum is said to have many species, it has 14,000 species. The species of orchids multiplied because they have widely propagated adapting themselves to different natural and climate conditions. They have propagated to all

Modern species of the tropical orchids



regions on the earth from the Arctic zone to the Antarctic zone, and from tropical forests to deserts.

The habitat of orchids is diverse. Some of them grow perched on the top of trees or on electric poles, striking roots on them and stretching their stems towards the earth, while some others occur and propagate in the soil like a mole. Some have flowers one millimetre across which are hardly visible, while others have flowers 30 centimetres across.

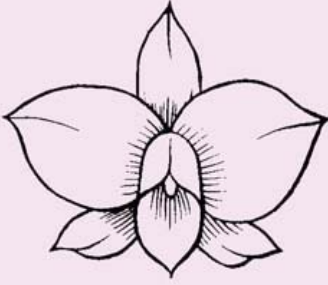
Orchids are classified into oriental and tropical orchids according to their origin. The tropical orchids are again divided into three groups: terrestrial orchids which grow on the ground, epiphytic orchids which grow perched upon trees and saprophytic orchids which live on dead or decaying organic matter. *Kimilsungia* is an epiphytic orchid belonging to the tropical orchids.

The orchid family comprises about 600 genera and *Kimilsungia* belongs to the *Dendrobium* genus.

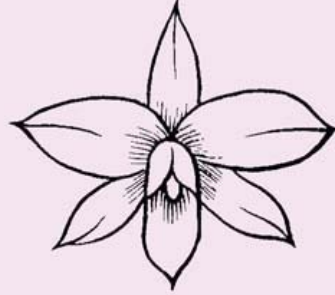
Dendrobium is a name composed of Greek words *dendron* meaning one tree and *bios* meaning “live”. It derived from the characteristic feature of the tropical orchids which grow perched



Flowers of the original breeds of Kimilsungia



Dendrobium phalaenopsis



Dendrobium bigibbum



Dendrobium superbiens



Dendrobium taurinum

on trees.

The *Dendrobium* genus is a very large genus of the orchid family. It comprises about 1,600 species and about 100 species of ornamental value. Many crossbreds have been produced with these species as mother plants. Species of ornamental value among them are divided into two groups. One group is improved varieties deriving from *Dendrobium nobile*.

They resemble *Dendrobium moniliforme* occurring in the south of the Korean peninsula and on Jeju Island. They have been crossbred mainly with *Dendrobium nobile*. As their leaves fall during dormant period they are called deciduous species.

Another group comprises improved varieties deriving from *Dendrobium phalaenopsis*.

Original Breeds of Kimilsungia and Their Characteristic Features

Name of original breeds	Main characteristic features		Home
<i>Dendrobium phalaenopsis</i>	Stalk is 30-60 cm long, fleshy and clavate Leaf—2 x 12 cm, ovate Flower stalk—40 cm Diameter of flower—6-8 cm Number of flowers—6-15 Petal—round	Calyx leaf—cuspidate Labellum—its central part is long Colour of flower—reddish purple, rose-coloured Life span of flower—three weeks Flowering season—August-November (in the home)	Northeast Australia, New Guinea, Maluku Islands of Indonesia
<i>Dendrobium bigibbum</i>	Stalk is 20-40 cm long, clavate Leaf-2 x 8 cm, fleshy and ovate Flower stalk—15-30 cm long Diameter of flower—3-6cm Number of lower—10-15	Petal is twice as wide as calyx, curved backward. Labellum—cuspidate Colour of flower—reddish purple, deep rose-coloured Flowering season—all year round	Northeast Australia, New Guinea
<i>Dendrobium superbiens</i>	Stalk—80-100 cm long Leaf—3 x 12 cm, ovate and cuticular Flower stalk—40 cm long Diameter of flower—4.5-5 cm Number of flower—9-25	Petal—wide and curved backward Calyx leaf—curled backward Labellum—cuspidate Colour of flower—deep reddish purple, rose-coloured Flowering season—autumn	Northeast Australia New Guinea
<i>Dendrobium taurinum</i>	Stalk—100-200 cm long, sturdy and straight Flower stalk—100 cm, spiked Number of flower—over 20	Petal—curled backward Labellum—ovate, light rose-coloured Calyx leaf—long and white Colour of flower—deep maroon	Luzon Island and Mindanao Island of the Philippines

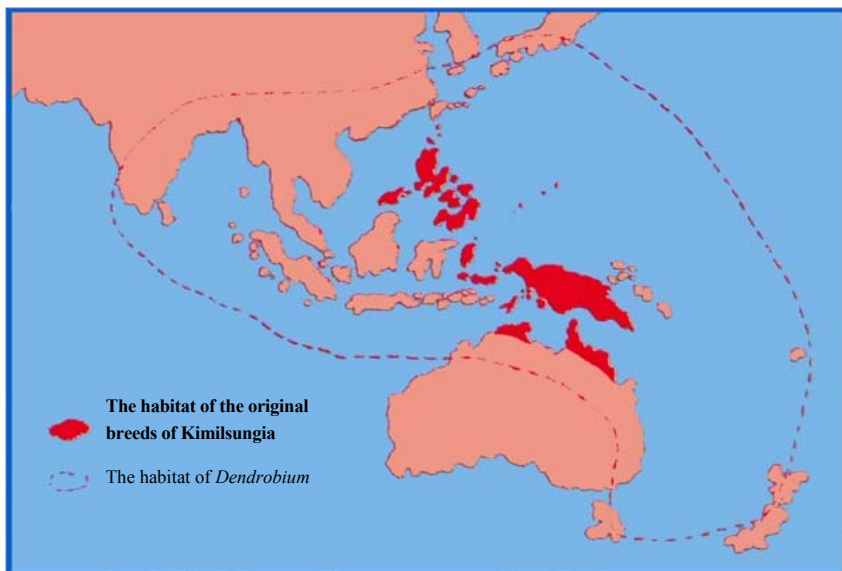
They are improved varieties bearing beautiful flowers. They have been crossbred mainly with *Dendrobium phalaenopsis* occurring in tropical forests and with other species having various characteristics.



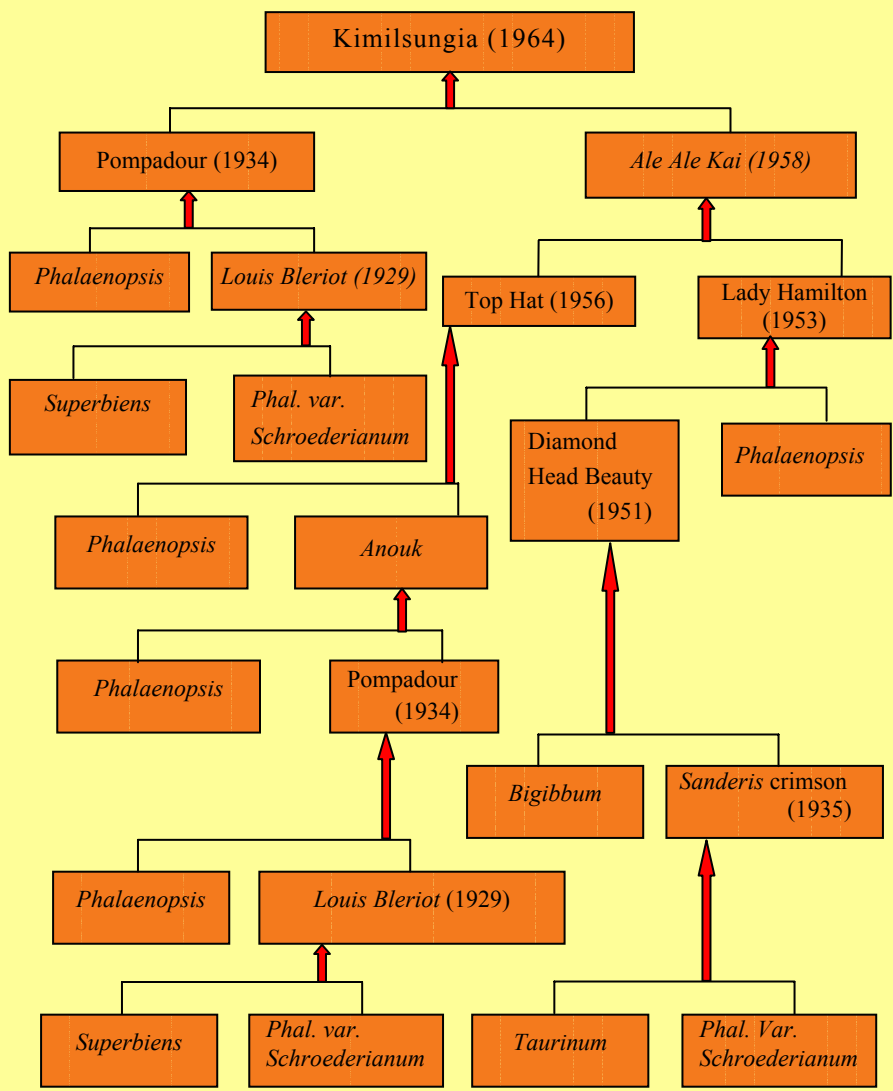
As their leaves do not fall during dormant period, they are called evergreen species. **Dendrobium—one of original breeds** Kimilsungia belongs to these species.

The mother plant which was used in crossbreeding this new flowering plant is called *Ale Ale Kai*, which has been produced by crossing five wild breeds with seven artificial hybrids several times. The father plant is Pompadour. It was used again in cross-

The home of the original breeds of Kimilsungia



Process of Breeding of Kimilsungia

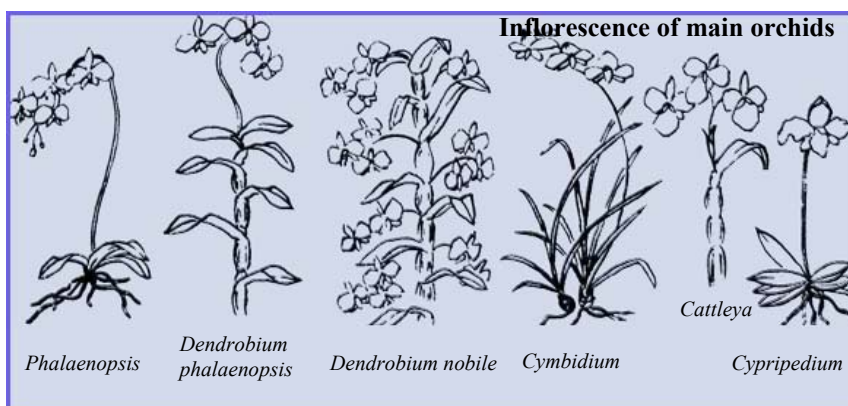


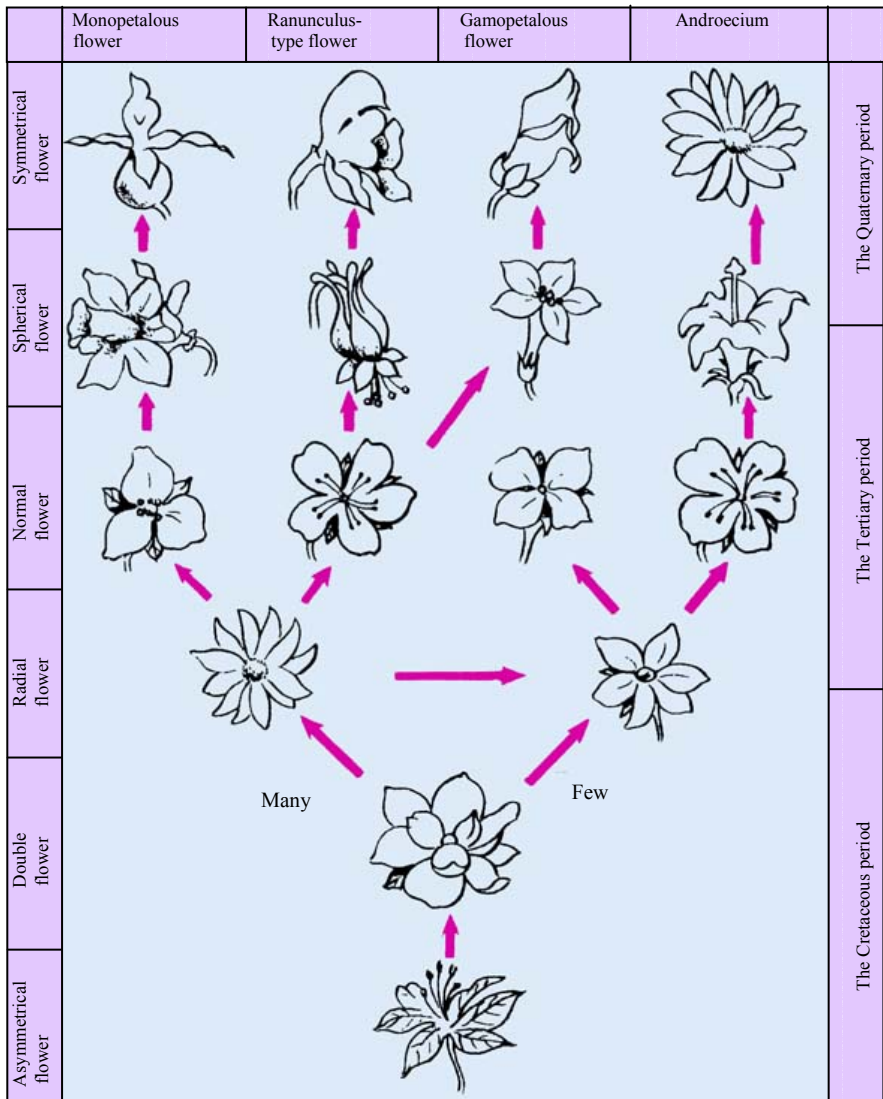
breeding the artificial hybrid which played a major role in the tribe of Top Hat, the mother plant.

All these wild breeds have usually red petals and sepals. Only *Taurinum* has white tips of sepals. When crossbred with red tribes white colour appeared on the tips of calyx leaves in the next generation due to the intervention of gene.

In Bunt's breeding room the crossbreeding of *Dendrobium phalaenopsis* was carried out so as to preserve its good qualities and replenish its shortcomings. It bears round petals and large flowers of great ornamental value. This original breed was eight times used in crossbreeding to preserve and fix its good qualities in the hybrid. The shortcomings of *Dendrobium phalaenopsis* are that it bears small flowers and weak peduncles. These shortcomings have been suppressed by crossbreeding it with *Superbiens* and *Bigibbum*. Thick petals, long-lasting flowers and sturdy stems and other good qualities have been inherited from *Taurinum*. As a result, an ideal variety of flowering plant has been produced. This is Kimilsungia.

Kimilsungia is a perennial plant belonging to the *Dendrobium moniliforme* of the orchid family. Its botanical name is *Dendrobium Kimilsungia*.





Evolution of flower

ORCHID AT THE CULMINATION OF ITS EVOLUTION

The plants of orchid family have highly been developed in the form and structure of flower among monocotyledons.

Among dicotyledons the plants belonging to the chrysanthemum family are in the last stage of its evolution. The flowers of orchid family plants are far more various than those of the chrysanthemum family plants, in their forms and colours; there are cloud-shaped, star-like, screw-shaped, with long labellum, pendent and other queer flowers. They are of red, scarlet, yellow, white, purple, green, maroon and other colours and their intermediate tints.

However, close investigation reveals a common characteristic in their complexity. It is that orchid flowers are composed of three petals and three calyx leaves like other monocotyledons.

The colours of petals and calyx leaves of some flowers are the same, whereas some others are of quite different colours.

And the petals of both sides have the same forms, whereas the petal in the middle part is projected out in a labial shape. This is also the characteristic feature of orchids.

Another characteristic of orchid is

that the flower is whorled.

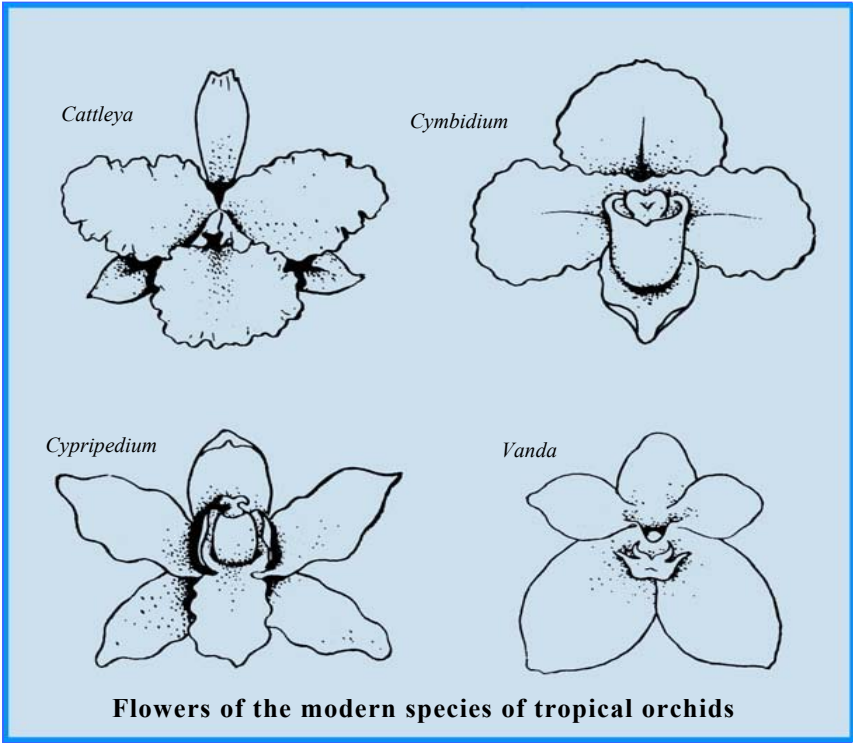
When the orchid is in bud, labellum is in the upper position but when flower comes into bloom, it makes a complete turnabout and is placed in the lower position so that it is convenient for insects to settle on it.

The labellum of the orchid has various forms and performs particular function. The labellum of a flower of an orchid looks like a scoop, which contains some poisonous liquid in it. Once a "visitor" of an insect gets into the scoop it never can come out of it because its inside wall is slippery. The insect is slightly intoxicated by the liquid in the scoop. The only way for the insect to come out of it is a narrow hole which is under pollen mass. Passing through this hole, the insect is stuck with pollens and pollinates other flowers.

The labellum of an orchid in Australia resembles just a female bee in shape and colour. Therefore, a male bee flies in after a "female bee" and at that time pollens are carried away by the male bee and pollination is made.

As seen above, the orchids attract bees with different means.

Kimilsungia has been born in the world of this orchid as a very delicate charming flower.



ENGLISH DAISY

English daisy was gifted to President Kim Il Sung by V.L. Bos, the director of the Ocean Freight Transport Agency in the Kingdom of the Netherlands on December 20, Juche 65 (1976). It is a perennial plant belonging to the chrysanthemum family. It grows about 10-15 centimetres high.

Its leaves are serrate and grow gregariously from the neck of the root.

The flower stalks bear white or light pink small flowers in the capitulate inflorescence on their tip. The flower is double flower and beautiful.

It is propagated by seed, separation of cluster and planting of cuttings.



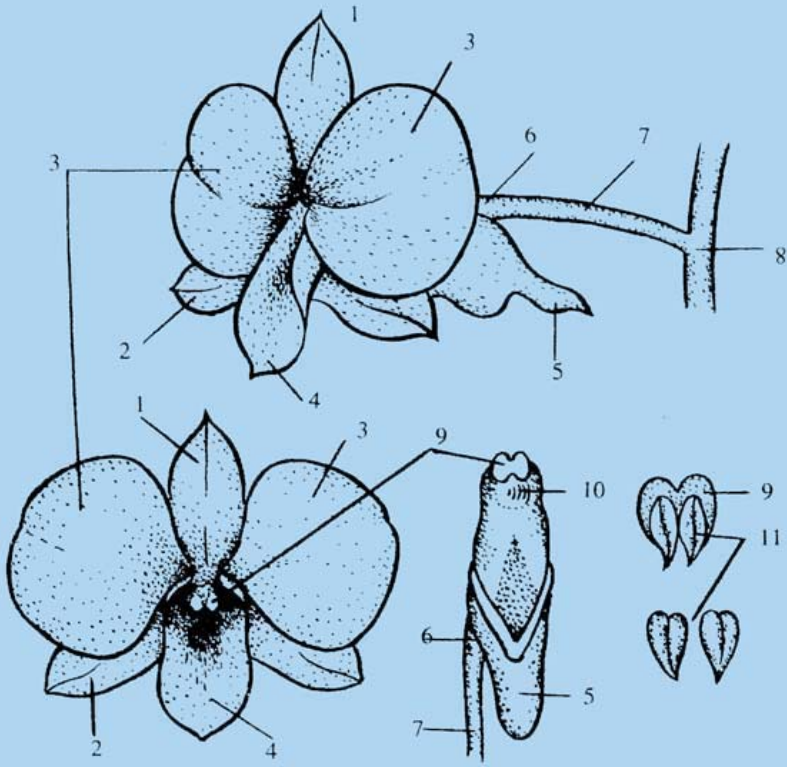
BUTTERFLY-SHAPED PINKISH-PURPLE FLOWER

The flower of *Kimilsungia* is beautiful, fantastic flower. Its butterfly-shaped fine petals with curve, labellum protruding forward, calyxes arranged in a form of star and calyx leaves are all of pinkish-purple colour.

Kimilsungia is a symmetrical flower. It is a typical butterfly-shaped flower. Its flowers are 7-8 centimetres across. They are large among orchids. The flower consists of three petals, three calyx leaves, one stamen and one pistil. Calyx leaves are modified like petal and have the same colour, so they look beautiful.

The flower of *Kimilsungia*





Floral structure of Kimilsungia

1-upper calyx 2-lateral calyx leaf 3-petal 4- labellum 5-tubular spur
 6-ovary 7-peduncle 8-flower stalk 9-anther 10-stigma 11 - pollen mass

As seen from outside, the calyx leaf which tends upward from the centre is called upper calyx leaf and the other two on the left and right side are called lateral calyx leaves. Of the three inner petals, the petal on the right and the one on the left are of the same form and size and generally called petals. The lip-like hanging petal in the centre is called labellum. The labellum is covered with the soft purple hairs in the central part. So it is convenient for insects to alight.

Calyx leaves are arranged in a triangle between petals and a labellum.

They are shaped like a wide willow leaf and is narrower in width than petals and nearly as long as petals.

The specific feature of a calyx leaf is that their colour gradually lightens toward the tip and becomes white at the tip. There are cases in which the white speck is not clear.

There is a tubular spur projecting downward on the lower part of



The petals of Kimilsungia



The backside of Kimilsungia

labellum placed below lateral calyx leaf. The tubular spur is hollow and has a nectary inside. The lower elongation of the style joins the labellum which is enveloped by two lateral calyx leaves.

The flower is pinkish-purple. Originally flowers have different colours. It is because the cells of petals have a pigment. But white colour is not produced by a white pigment, but by air filled between cells of petals. It is the same as waterfall looks white. Green, purple and red flowers have pigment called anthocyan. It turns green in alkalinity, purple in neutrality and red in acidity.

In case of Kimilsungia, the pigment is mainly contained in the cells in the surface layer of its petals and less in the cell layers beneath it. Much pigment is contained in the upper surface of petals and less on their back surface. It mainly consists of colouring matters belonging to anthocyan.

The middle part between upper and back surfaces of the petal consists of spongy cells with many tiny pores. The air contained in these pores disperses light, which makes the petals look white. This plays an important role in making the colour of calyx vivid.

The case of calyx leaf is similar to this. It has only fewer cells and less pigment.

On the deeply coloured part in the middle of labellum skin cells are arranged protuberant elongatedly and contain much pigment.

Skin cells protruding elongatedly like a hair shut out the slant light, producing shade, which deepens the colour.

One thick style rises from the middle of the surface of labellum. It bears, at the top of an anther, stigma and style beneath it. The anther is protected by the anther lobes. These lobes come off easily when they mature, revealing two yellow pollen masses.

Below the anther the stigma in front is hollowed out into a

The style of *Kimilsungia*



The flower buds of *Kimilsungia*



depression which is covered with viscid fluid. When the insect visits the flower with pollens adhering to its body and tries to push through the small gap between labellum and style, the pollens stick to the viscid fluid on the stigma.

The flowers of *Kimilsungia* bloom consecutively going upwards. The stem of *Kimilsungia* has several nodes and puts forth flower stalks from the third or the fourth node, which bear flower buds. One flower stalk bears 3-15 flowers which come into bloom consecutively and hang in a crescent shape. Flowers are divided into determinate and indeterminate inflorescence. The flower of *Kimilsungia* belongs to the indeterminate inflorescence. It takes 45-55 days for the plant to put forth flower stalks and bear the first flower. The flowers are out for about two months.

FLOWER AND MAN

If the history of the earth is likened to one day, that is, 24 hours, it can be said that the birth time of mankind was 23:59, one minute before the last hour. That one minute's interval from then to today was in fact equivalent to over

two million years, during which beautiful flowers were already in full bloom on hills and fields.

With the creation of ancient culture another five millennia have passed by through the era of primitive man.

People selected beautiful flowers, and grew them to get more splendid flowers, and, in the course of this, grafting was invented and widely used.

With the rapid development of genetics, cytology and other sciences, modern technology of cultivation was widely introduced; different chemicals and X-rays were used. As a result, a lot of beautiful flowers, as we can see today, have been bred.

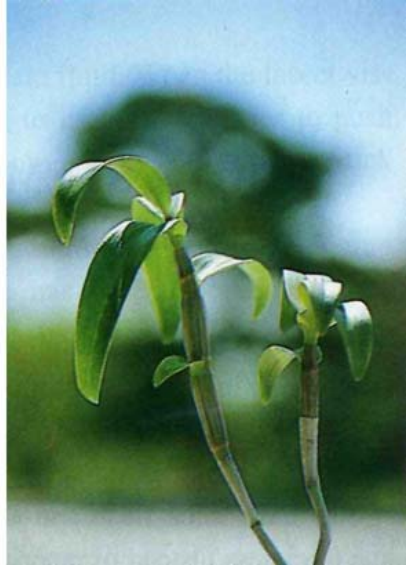


ROOTS, STEMS AND LEAVES ARE RESISTIVE TO DROUGHT

The original breeds of Kimilsungia grew perched on a rock or on a tree branch in the dry condition. As a result, the roots, stems and leaves of Kimilsungia have acquired special tissue to survive dry condition. It has thick hairy roots. Unlike the roots of other plants its roots have thick flesh and are thick and grow nearly with the same thickness instead of tapering toward the end. Instead they are not many and have a few branches.



The roots of Kimilsungia



The stems of Kimilsungia

The root consists of the green and glossy part on the surface and the part containing the white spongy layer on the back. Cells in the spongy layer are hollow and play the role of a mouth sucking moisture.

Short hairy roots come forth from the end of the roots. The roots are viable for two years at least and even the old roots are always active except for the winter.

The stem is tough like a bamboo and is nodular.

Generally, orchids are divided into one-stemmed and two-stemmed orchids. Kimilsungia belongs to the two-stemmed orchids.

Kimilsungia and other two-stemmed orchids stop growing when new shoots reach a certain length and their stem matures. The matured stem has bud eyes on a lowest node, which germinate when definite condition is provided and grow into new stems. When those stems stop growing and mature, new shoots come forth again from their lowest node and grow to be stems.

The stem is shaped like a long club and its upper and lower parts are slender while its middle part is thick.

The length of the stem differs with the growth conditions. It grows 30-60 centimetres long in the ordinary hothouses in Korea and is 1-1.5 centimetres across in the thickest part.

The surface of the thick and long stem is covered with a thick cuticle. So it is resistive to drought and retains water within it.

The stem usually has 12-15 nodes.

The leaves of Kimilsungia are thick and cuticular to resist drought.

Leaves come forth alternately by one from the nodes of the stem. Six leaves beginning with the first leaf have only petiole without leaf body. They are called primary leaves. Leaves from the seventh one have well-developed leaf body and petiole.

Unlike the primary leaves, their leaf body grows larger than the petiole. The thirteenth or fourteenth leaf is the largest. These leaves are called intermediate leaves. They are shaped like a willow leaf and are thick and glossy. Two or three leaves coming forth following the intermediate leaves have very short petiole or nearly no petiole and their leaf bodies directly join the nodes of the stem.

The area of a fully spread leaf is usually 30-40 square centimetres and the largest of the intermediate leaves is 50 square centimetres or above.

The form of leaves changes influenced by environment. They thicken when exposed to strong sunlight.

The leaves of Kimilsungia



THE TIME-HONOURED SCENERY OF THE WILLOWY CAPITAL

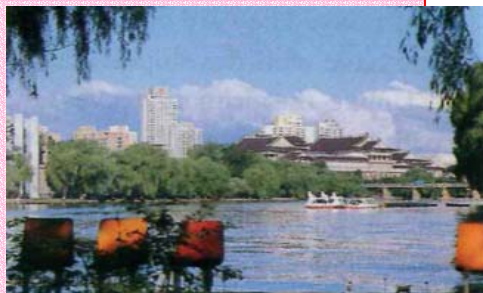
One August day in Juche 61 (1972), President Kim Il Sung on his way back from his field guidance looked at the prosperous willows on the street through the car window and told the following story to the officials accompanying him.

One day in the year after liberation he met some old men in front of the Ryongwang Pavilion on the bank of the Taedong River. While talking with them frankly, he asked them what kind of tree should be planted on the streets of the capital.

After a moment's thought an old man said that from olden times Pyongyang was famous for willows and it was desirable to plant many willows there.

Listening to him, he read the mind of the people keeping the pride of Pyongyang, the ancient capital, even in planting the street trees.

As a result, many willows were planted as street trees in Pyongyang. The time-honoured scenery of the willowy city (Ryugyong) has been created in this way.



ORCHID INDUSTRY

In the 1970s the technique of mass-

propagating plants belonging to the orchid family by tissue culture method and of industrializing the process of culture is run as an enterprise in different countries. This field is called an orchid industry.

With the development of technique of mass-propagating *Kimilsungia* by tissue culture method the orchid industry was created in the DPRK.



CAREFUL TENDING OF FLOWERS



HABIT OF THE FLOWERING PLANT

Kimilsungia has been evolved to be incomparably more beautiful and larger flower than its original breeds but its ecological character did not change much.

It does not always require high temperature. As Kimilsungia is a tropic plant, it grows well at comparatively high temperature. Its requirement differs by the periods of growth.

The period from sapling to flowering is called the period of early growth. In this period the temperature the plant requires is 21-25°C at night and 26-30°C at daytime. The appropriate temperature for the plant is 23°C at night and 28°C at daytime. Difference between night and daytime temperature

is desirable to be about 5°C.

During vegetative growth when new sprouts come out and grow from the full-grown plant, the plant requires such temperature.

When the state in which temperature in the greenhouse falls beneath 15°C lasts for about one week, growth stops. Even if temperature rises over 30°C, growth delays.

During reproductive growth the plant requires that the daily average temperature should be over 23°C. When temperature of about 15-18°C holds for long in this period, flowers may become yellow and fall. After flowering temperature may be kept at 21-25°C at daytime and at 16-18°C at night.

GROUND PINK

Ground pink is the plant presented to President Kim Il Sung by the Union of Okkaki City Dietmen for the Promotion

of Friendship between Japan and Korea in Japan on the 13th of April in Juche 67 (1978). It is an annual plant belonging to the *Polemonium* family.

It is 40-50 centimetres high and puts forth many branches. Its leaves are ovate and alternate on stems.

Opposite flower stalks come forth from among leaves and branch several times and bear trumpet-shaped flowers on their tip. The flower has five petals and their colour is pink, pinkish-violet, red and white. It is propagated by seed.



During wintering it is advisable to keep temperature at over 18°C at night.

At the temperature of 3-5°C the leaves, receiving damage from cold weather, become yellow and chlorophyll is destroyed. They fall from the stalk at a touch.

At the low temperature below 0°C the plant gets frost-bitten. In the case of serious frost-bite new sprouts do not come out from the bottom of the stalk in the next spring.

When the temperature of the leaves rises over 50°C, exposed to straight sunlight, the tissue of leaf may instantly get burns. Therefore, strong straight sunlight must be shaded and the highest

temperature in the greenhouse must not exceed 35-37°C.

Excessive Humidity Is Taboo: As some original breeds of Kimilsungia grew in the region where the rainy season and the dry season were clearly distinct, they grew in the rainy season with high humidity and had the dormant period of growth in the dry season. The growth cycle of these plants often changes with moisture rather than with temperature.







Kimilsungia which retains the habit of its original breeds is highly resistant to drought but less resistant to high humidity. Therefore, excessive humidity is not allowable.

VARIETY OF FLOWER SHAPE

As for flower shapes there are an apopetalous flower, gamopetalous flower, flower with scarcely distinguishable petals of monocotyledons, polysymmetrical flower with over three symmetrical planes

and zigomorphic flower with one symmetrical plane.

Kimilsungia, which is a monocotyledon has zigomorphic flowers.

	Polypetalous Corolla	Gamopetalous corolla	Flower of the monofoliolate plant
Polysymmetrical flower	<i>Geranium thunbergii</i> 	Japanese bearbind 	<i>Hemerocallis disticha</i> 
Xygomorphic flower	<i>Saxifraga furumii</i> 	<i>Veronica persica</i> 	<i>Commelina communis</i> 

Humidity appropriate for the growth of Kimilsungia is 60-80 per cent.

It must be seen that humidity does not decrease when flower buds are formed and come into flower. When humidity falls below 50 per cent, flower buds fail to maintain moisture balance and become yellow and may fall. Therefore, humidity should not be lower than 60 per cent. Even when humidity is higher than 80 per cent care must be taken lest flower buds are attacked by saprogenous bacilli.

During wintering low humidity does not affect the plant, but it may be attacked by Tetranychus sp. and other harmful insects. Therefore, it is necessary to maintain about 60 per cent of humidity.

CAM-type Photosynthesis: Generally speaking, at daytime the plants absorb carbon dioxide, opening stomata of leaves, and perform photosynthesis with solar energy. There are plants which absorb carbon dioxide opening

stomata of leaves and preserve it in organic acid at night and at daytime close the stomata and do photosynthesis with carbon dioxide acquired from the preserved organic acid and solar energy. Such is called CAM-type photosynthesis. The plants which carry out photosynthesis in this way is called CAM plants.

Kimilsungia performs CAM-type photosynthesis. Kimilsungia conducts photosynthesis closing the stomata of leaves at daytime. It is the result of the evolution of its original breeds with their roots exposed to the air in such manner that they close stomata at daytime so as to evaporate less moisture and absorb carbon dioxide opening stomata at night.

Therefore, in cultivation of Kimilsungia it must be seen that sufficient carbon dioxide is absorbed at night. Absorption of carbon dioxide begins at about 18 o'clock and becomes most

A MEETING FOR EXCHANGING EXPERIENCES IN GROWING KIMILSUNGIA

On April 12, Juche 88 (1999) the meeting for exchanging experiences in growing Kimilsungia was held at the Pyongyang International House of Culture. At present there were officials of agencies concerned, researchers, gardeners and growers who are engaged in growing Kimilsungia at a few units.

At the meeting the successes and experiences in studying the method of growing Kimilsungia and propagating

it broadly were published.

Speeches suggested theoretically and practically important problems such as the method of growing Kimilsungia by stages, that of its quick propagation by change of temperature of the water, that of adjustment of blooming and experience in blooming Kimilsungia at a greenhouse and at home and gave scientific and technical answer to them, and thus left deep impression on the audience.

SCARLET SAGE

Scarlet sage was presented to President Kim Il Sung on April 13, Juche 67 (1978) by the Union of Okkaki City Dietmen for the Promotion of Friendship between Japan and Korea in Japan.

It belongs to the *Salvia* family and an annual plant. It is mainly planted in parks and recreation grounds in Korea. It bears scarlet flowers. It is evocative of a flame. Hence its name “Pulkkot” (fiery flower). Its stem grows up straight and is 40-100 centimetres high and square.

Its leaves are egg-shaped and opposite leaves come forth from each node of the stem. They come forth alternately from the upper and lower nodes.

Several flowers come out on the

flower stalks, which come forth from the stem and the branches. It bears about 30 flowers in one inflorescence. Flowers come into bloom consecutively, going upward. Their petals and calyx leaves are all scarlet. After petals fall calyx leaves remain, so the flowers look blooming long.



intensive at about 3 o'clock and nearly stops at about 9 o'clock in the morning.

It is very important to expose *Kimilsungia* to sunlight to suit its specific photosynthesis.

In the light of requirement for sunlight, *Kimilsungia* is akin to shade plants which do not require strong sunlight. At normal temperature photosynthesis proceeds most intensively at 15,000-20,000 luxes of sunlight.

In order to secure such intensity of sunlight it must be controlled properly in accordance with the periods of growth.

During vegetative growth, that is, from March to mid-May the plant is grown without shading the sunlight as far as possible.

From June to August it is advisable to shade sunlight by 60-70 per cent.

During reproductive growth, that is, from mid-August to October, the plant should be sufficiently exposed to autumn sunlight, gradually removing shading blinds.

It must be seen that even during wintering the plant should be sufficiently exposed to sunlight.

For the purpose, the length of daily period of illumination must be taken into consideration.

As *Kimilsungia* performs CAM-type photosynthesis, it is desirable to make the length of day and night be about 12 hours respectively. In winter when the daytime is short, it is desirable to use

fluorescent or incandescent electric lamp for supplementary lighting so as to make the length of illumination be about 14 hours.

The length of the daily period of illumination exerts influence on the differentiation of flower. When new sprouts come out late and vegetative growth proceeds in the period from autumn to winter, it is necessary to suppress the formation of flower buds while lengthening the period of vegetative growth so that the plant grows big. For the purpose, supplementary illumination is necessary. For supplementary lighting one or two 40 watt fluorescent lamps are installed per one

square metre of flower stands. It is advisable to ensure 14 hours of illumination.

Fresh Air Is Good: The original breeds of *Kimilsungia* grew adhering to the stumps of trees or rocks in the forest. So supply of fresh air is essential for its growth.

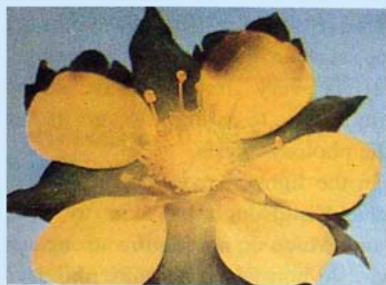
Ventilation should be done often to supply fresh air. In summer when temperature is high and sunlight is strong the windows of the greenhouse are opened to ventilate air sufficiently. In winter it is desirable to ventilate air by little time in the daytime.

In cultivating *Kimilsungia* it is necessary to supply fresh air to its roots while ventilating" air for its upper part.

COMPLETE FLOWER AND INCOMPLETE FLOWER

A flower, in general, has calyx leaves, petals, stamens and pistils. A flower which has these all components is called a complete flower and a flower which lacks one or more pieces of them is called an incomplete flower. There are such incomplete flowers as *Saururus chinensis* and *Chloranthus japonicus* which lack calyxes and petals. A flower without stamens or pistils is an incomplete flower. *Kimilsungia* is a complete flower.

Incomplete flower (vertical stem type).
It has no calyxes nor petals.



Complete flower (*Duchesnea indica*).
It has calyxes and petals.

Incomplete flower (*Anemone nikoensis*).
It has no petals.



DIFFERENT METHODS OF REPRODUCTION

Vegetative Reproduction

Generally speaking, even if a certain part was separated from the plant, by virtue of its nature, it regenerates necessary organs when conditions for existence are provided. Such phenomenon is called regeneration.

Almost all plants can be reproduced vegetatively on the basis of the phenomenon of regeneration.

Kimilsungia can be reproduced vegetatively by separating a cluster, planting of bud sticks and layering old branches.

Separation of Cluster: Kimilsungia grows many stems. When 4-6 stems come out, the stems may be separated by two or three and planted.

When separating a cluster, shears

Separation of cluster of Kimilsungia.



and hands should be cleanly disinfected lest the plant be infected with viruses or bacilli during separating.

When separating a cluster, the plant is taken out of the flowerpot by holding the neck of its root with left hand and the old culture medium such as sphagna or charcoal is removed and dead and infected roots are cut away. After trimming roots the neck of root to which stems are attached is cut with shears.

It is desirable to separate a cluster so that the stems with new sprouts should be one or two stems less than old stems. Because old stems are less reviscent.

The lesion is dusted with sulphur powder to prevent infiltration of miscellaneous bacteria.

The separated stems are planted in

Dusting of sulphur powder on the cut of the neck of root



flowerpot and sufficiently watered and put to the place not exposed to strong sunlight till they are acclimatized.

Then after one or two months new sprouts come out and grow from the lower sprouts and bear flowers in the same year.

Separating and Planting of Buds: Kimilsungia has three or four eyes, which will develop into bud eyes, on the lower part of its stem and three or four eyes which will develop into flower buds or bud eyes on the upper part of its stem.

The eyes on the lower part of the stem in no case grow to be flower buds but the eyes on the upper part of the stem may develop into flower buds or bud eyes in accordance with conditions. Particularly when temperature and humidity are high and when the eyes on the lower part of the stem become extinct, attacked by harmful insects, the eyes on the upper part of the stem often develop into bud eyes

instead of becoming flower buds.

The buds which grow on the upper part of the stem are called upper buds. There are cases in which upper buds may again differentiate into flower buds, which come into flower. But they are of less ornamental value. So upper buds are separated and used for reproduction.

The shoots which come out on the lower part of the stem in spring or summer may be used for reproduction. It is advisable to separate shoots when they grow 5-10 centimetres long and strike new roots.

Then other lateral buds germinate and grow on the lower part of the stem. After separating the shoots it is desirable to dust the lesion with sulphur powder to prevent the infiltration of bacteria.

Layering of Old Stem: When Kimilsungia is cultivated or when the flowerpot is changed there appear poor-looking or leafless old stems. All

CHINA ASTER

China aster was presented to President Kim Il Sung on April 13, Juche 67 (1978) by the Union of Okkaki City Dietmen for the Promotion of Friendship between Japan and Korea in

Japan. It is an annual plant which belongs to the chrysanthemum family. It is mainly planted in parks and recreation grounds.

It grows 25-50 centimetres high and branches. Its leaves are ovate and serrate on their edge.

Flower stalks come forth from bracts and bear red flowers by one in capitate inflorescence on their tip. It is propagated by seed.





Layering

the old stems should not be cut away on the plea that leaves had fallen.

Because the old leafless stems exert effect on the growth of new shoots and flowering.

Only when a cluster has five or six stems one or two old stems may be cut off for reproduction. The cut-off old stems are laid in the wooden box filled with sphagna. Then they are sufficiently watered and covered with vinyl sheet. They are tended well, while keeping air humidity at 80-90 per cent and temperature at 25-28°C. When new shoots grow and strike roots, the grown shoots are separated from the old stem and transplanted in flowerpot. It is rare that the transplanted shoots bear flowers that year. In most cases the next year the second new shoots grow and bear flowers.

Reproduction by Tissue Culture of the Growing Point

The method of reproduction by tissue culture of the growing point is a modern method of reproduction by which a certain size of the tissue of the

growing point is separated from the plant and cultured in the germfree culture medium and thus a new plant is acquired. This method, in essence, is a method of vegetative reproduction.

Unlike the culture of the growing point of other plants, culture of the growing point of the plants belonging to orchid family has a certain specific feature.

In case of cultivating the growing point of orchids a protocorm-like body is formed, whereas in cases of other plants there appears lesion tissue or a polyembryonic body. This protocorm-like body is multiplied and differentiates into a new plant.

Formation and Cultivation of a Protocorm-like Body: This stage of cultivation generally is called primary cultivation. In primary cultivation a protocorm-like body is formed from the growing point.

For the formation of a protocorm-like body from the growing point at first culture medium serving as the source of nutrients is prepared and the growing point is separated from the stem in germfree condition and inoculated into culture medium and then cultivated in the cultivation room.

In order to make culture medium the stored solution must be prepared beforehand.

When making culture medium it is inconvenient to weigh chemicals each time. So original solution for culture medium is prepared beforehand and stored in a refrigerator. This solution of chemicals is called the stored solution.

In order to prepare the stored solution, 200 ml of distilled water is put in a conic flask with a capacity of 250 ml and chemicals are weighed and added to it to dissolve. Then it is moved to a volumetric flask with a capacity of 500 ml and distilled water is added to it till the level of solution rises up to the tip of calibration.

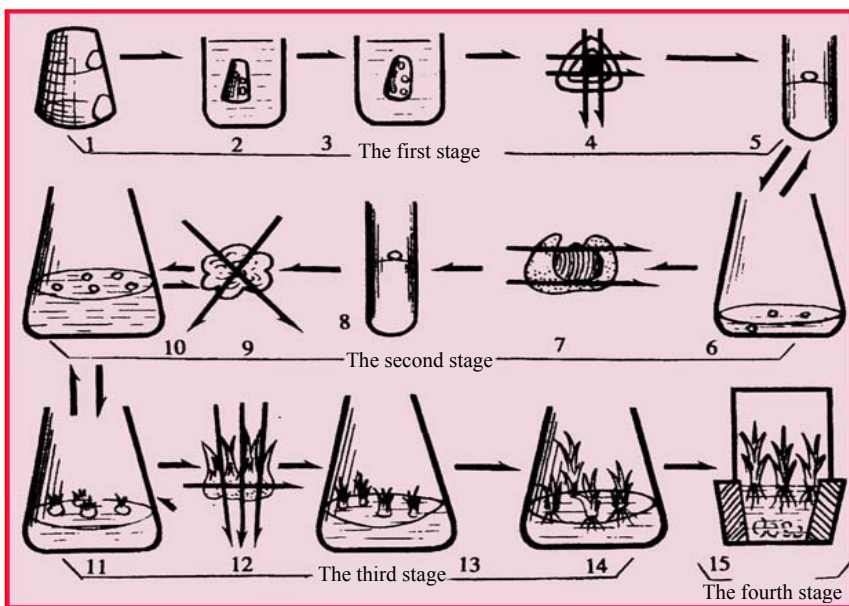
When different chemicals are put into the same bottle, another chemical must be put into it after one chemical is completely dissolved. Calcium,

magnesium and other chemicals, which react with each other and form precipitation, must not be put into the same bottle.

The stored solution of growth stimulator is prepared as follows: 2-3 ml of alcohol is put in the beaker with a capacity of 100 ml and 50 mg of chemical is weighed and dissolved while heating it in the water bathtub. When it does not dissolve well several drops of 0.1 normal solution of caustic soda are added to the solution.

Prescription for Stored Solution

Number of stored solution	Constituents	Quantity of chemicals contained in 500ml of stored solution
1	Calcium nitrate	50g
2	Magnesium sulphate	12.5g
3	Ammonium sulphate	25g
	Potassium dihydrogen phosphate	12.5
	Manganese sulphate	375mg
4	Ferrous sulphate	1.25g
	Trilon B	1.67g
5	Sulfuric acid (specific gravity 1.83)	0.25ml
	Manganese sulphate	1.5g
	Zinc sulphate	250mg
	Boric acid	250mg
	Copper sulphate	12.5mg
	Sodium molybdate	12.5mg
6	Alpha-naphthyl acetate	50mg
7	Benzil adenine	50mg
8	Thiamin	50mg
9	Nicotine acid	250mg
10	Pyridoxine	250mg



Stages and processes of tissue culture of Kimilsungia

1 – Control of new shoots 2 – Disinfection with 7 per cent solution of chloride of lime 3 – Washing in the sterile water 4 – Separation of the growing point 5 – Primary inoculation and formation of PLB 6 – Primary multiplication in fluid and solid culture medium 7 – Removal of shoot rudiment 8 – Series of primary multiplication 9 – Separation of PLB 10 – Series of mass multiplication 11 – Differentiation of shoots 12 – Separation of shoots 13 – Striking of roots 14 – Culture of saplings 15 – Acclimatization culture

Distilled water is put in the conic flask with a capacity of 250 ml and heated and then the solution of the above-mentioned chemical is added to it little by little and shaken lest precipitation is formed. 50 mg of thiamin, 250 mg of nicotine acid and 250 mg of pyridoxine are dissolved in 500 ml of distilled water separately to prepare the stored solutions of thiamin, nicotine acid and pyridoxine.

These solutions of chemicals are added together after the solution adhering to the beaker is cleanly washed

away with distilled water.

The solution is moved to the volumetric flask with a capacity of 500 ml and distilled water is added up to the tip of calibration.

After the stored solution is prepared in this way culture medium for primary cultivation is made in accordance with the prescription.

500 ml of culture medium for primary culture is prepared as follows:

At first 100 ml of distilled water is put in the round bottom flask with a capacity of 500 ml, 5 ml of 1st-4th solutions

each and 0.5 ml of the 5th solution are put to it and 10 ml of the solution of alpha-naphthyl acetate, 2.5 ml of solution of benzyl adenine and 0.5 ml of thiamin, nicotine acid and pyridoxine each and 10 grams of sugar are added and are completely dissolved.

This solution is put in a volumetric flask with a capacity of 250 ml and distilled water is added to the tip of

calibration.

The potential of hydrogen of culture fluid is adjusted with 0.1 normal hydrochloric acid or solution of caustic soda so that when 2 ml of the above-mentioned solution and 2 ml of distilled water are put in the test tube its pH be 5.2.

Because when the solution of agar-agar is added to the culture fluid its pH should be 5.2.

Prescription for Primary Culture Medium

Number of stored solution	Constituents	quantity in one line of culture fluid	
		constituents (mg)	stored solution (ml)
1	Calcium nitrate	1,000	10
2	Magnesium sulphate	250	10
3	Ammonium sulphate	500	
	Potassium dihydrogen phosphate	250	10
	Manganese sulphate	10.5	
4	Ferrous sulphate	25	
	Trilon B	33.5	10
5	Sulfuric acid (specific gravity 1.83)	0.0005 (ml)	
	Manganese sulphate	3	
	Zinc sulphate	0.5	
	Boric acid	0.5	1
	Copper sulphate	0.025	
	Natrium molybdate	0.025	
6	Alpha-naphthyl acetate	2	20
7	Benzyl adenine	0.5	5
8	Thiamin	0.1	1
9	Nicotine acid	0.5	1
10	Pyridoxine	0.5	1
11	Sugar	20,000	
12	Agar-agar	8,000	
13	Activated carton	1,000	

Four grams of well refined agar-agar is put to 260 ml of distilled water and is dissolved while heating and 0.5 gram of activated carbon added to it, and mixed.

The mixed solution of agar-agar and activated carbon is mixed with the culture fluid.

Attention must be paid to the fact that when agar-agar is not well refined the pH may change. So before adding the activated carbon to the solution of agar-agar the pH of the solution of agar-agar must be ascertained whether it is neutral. When it is alkaline it must be adjusted with hydrochloric acid so that it be neutral.

When the solution for culture is prepared in this way 4-5 ml of it is put into over 100 test tubes respectively before cooling. These test tubes are set in the test tube stand and plugged with



New shoots from the bottom of stem

rubber stoppers or covered with aluminium foils and then sterilized for 15-20 minutes under the pressure of 0.1 megapascals in the high-pressure steam sterilizer.

After they are sterilized the stand with test tubes is removed and agar-agar is hardened or the test tubes are taken out of the stand and placed

The interior of the tissue culture room



inclined on the test board so that agar-agar is hardened.

After culture medium is prepared it is placed in the germfree room and inoculated with the growing point.

In order to inoculate the growing point new shoots are cut 6-10 centimetres long from the lower part of *Kimilsungia*, washed cleanly in tap water and brought in the germfree room.

In the germfree room the new shoots are cut into two and disinfected for 10-

15 minutes, immersed in 7 per cent solution of chloride of lime.

They are immersed in sterile water to wash away the solution of chloride of lime and are put on the sterile filter paper to remove moisture.

After fixing the disinfected shoots on the sterile rubber stopper with dissecting needle, bracts around the growing point are removed by one with a surgical knife.

It must be seen that the growing point is not hurt while laying it bare

MONOCLINOUS FLOWER AND DICLINOUS FLOWER

A lot of flowers have both stamens and pistils. These flowers are called monoclinous ones; the flowers having stamens or pistils either, and those which have the both, but are devoid of the function of one of the both, are called diclinous flowers. A diclinous flower which has stamens with their own function is called a male flower; that which has pistils with their own function is called a female flower.

Kimilsungia is a monoclinous flower.



Diclinous flower
(*Lyssimachia japonica*)



Monoclinous flower
(male flower of *Dioscorea tokoro*)



Monoclinous flower
(female flower of *Dioscorea tokoro*)



The Kimilsungia Greenhouse in the Central Botanical Garden

with the help of a binocular microscope.

The exposed growing point attached with two rudiments of leaf is cut off 1-1.2 millimetres long. It must be seen that the growing point is not hurt while not leaving superfluous stem tissue as far as practicable.

When there is much superfluous tissue around the growing point nutrients are not well supplied to the tissue of the growing point and its viability becomes less. On the contrary, when only the growing point is removed without no rudiment of leaf or when the growing point is hurt, its viability becomes less.

So one must be skilled in taking the material for inoculation exactly.

The removed material for inoculation is immediately inoculated into the culture medium in the test tube so that the cut surface of the material for inoculation contacts culture medium. It is advisable to make the cut portion enter the agar-agar culture medium while the

uncut portion is exposed outward.

The test tubes with inoculated growing point are placed on the culture stand in the culture room.

The temperature of the culture room is kept at 23-27°C and light of 2,000 luxes is put on for 14-16 hours a day.

When it is cultured for about one month in these conditions the cells of the growing point divide and multiply and form a green protocorm-like body.

Culture for Multiplication of a Protocorm-like Body: When the protocorm-like body formed in the primary culture is left alone, 1-3 buds differentiate and form an individual.

In order to acquire many individuals from the protocorm-like body it is necessary to repeat culture several times while cutting off the differentiated buds.

The process of culture for multiplication of the protocorm-like body may be divided into the stage of the

primary multiplication culture and that of mass multiplication culture.

The primary multiplication culture covers the stage of culturing a series of generation for 60-90 days in a cycle of 20-30 days. The mass multiplication culture covers the stage of further multiplication culture.

At the stage of the primary multiplication culture the ability to differentiate into individuals is great and the rate of multiplication is low and there are many which wither and die when a series of generation is cultured.

But at the stage of the mass multiplication culture the rate of multiplication is high and few tissues wither and die.

The culture medium for primary multiplication is prepared with 1 mg/l litre concentration of alpha-naphthyl acetate and 0.05 mg/l concentration of benzyladenine and excluding nicotine

acid and pyridoxine from the prescription for the primary culture medium.

It is desirable to prepare solid culture medium and fluid one for primary multiplication culture medium and culture the protocorm-like body in the fluid culture medium and solid one alternately in a cycle of 10-15 days. When it is cultured for 60-90 days with application of this method, the protocorm-like body with reproductive ability is acquired.

Then the culture conditions are given as in the primary culture. The protocorm-like bodies acquired at the stage of primary multiplication are divided by 4-6 and put in the new culture medium for mass multiplication.

The culture medium for mass multiplication is prepared without alpha-naphthyl acetate and benzyl adenine

MADAGASCAR PERIWINKLE

Madagascar periwinkle was presented to President Kim Il Sung by the Union of Okkaki City Dietmen for the Promotion of Friendship between Japan and Korea in Japan on April 13, Juche 67 (1978).

It is a perennial plant belonging to the Vinca family. It serves as ornamental and medicinal plant. It is 30-60 centimetres high and branches forth abundantly. Its leaves are ovate and glossy. They have short petiole and are opposite. The branches or flower stalks coming forth from the bracts bear pinkish violet or bright violet flowers in June-September on their tip. The flower has five petals. It is propagated by seed and cuttings. It can be made to flower all the year round in the greenhouse.



indicated in the prescription for the primary multiplication culture medium and with addition of 4 grams of sugar and 26 grams of dextrose per litre.

It is desirable to culture 7-8 generations of protocorm-like bodies in a cycle of 45-60 days.

Culture for Differentiation of Buds from the Protocorm-like Body: The protocorm-like bodies multiplied through the process of multiplication culture are put in the culture medium for differentiation of buds and cultured so that several embryonic tissues grow.

Culture medium for differentiation of buds is prepared with 1/4 concentration of inorganic salts and excluding of



Formation of organ from the protocorm-like body

growth stimulator and vitamins indicated in the prescription for the primary culture medium and addition of 10 grams of sugar per litre.

The protocorm-like body is cut 4-5 millimetres long and inoculated in the culture medium prepared in this way and cultured at the temperature of 28-30°C and exposed to the light of 2,000

Prescription for Root Differentiation and Sapling Growth Culture Medium

Number of stored solution	Constituents	Constituents (mg) in 500 ml of stored solution	Quantity in one litre of culture fluid	
			constituents (mg)	stored solution(ml)
1	Calcium nitrate	24,600	492	10
2	Manganese sulphate	6,520	125	10
3	Ammonium nitrate	32,000	640	
	Calcium nitrate	40,400	808	
	Potassium dihydrogen phosphate	6,600	132	10
4	Manganese sulphate	52.5	10.5	
	Ferrous sulphate	1,250	25	
	Trilon B	1,675	33.5	10
5	Tomato juice			200
6	Sugar		30,000	
7	Alpha-naphthyl acetate		0.5	5
8	Agar-agar		8,000	



The saplings of Kimilsungia growing in the culture bottle

luxes for 12-14 hours a day.

When they are cultured in this way for two or three months, many shoots come out.

Culture for Differentiation of Roots and Growth of Saplings: After differentiated bud tissues are put in new culture medium and strike roots, they are cultured to grow to be sound saplings.

The culture medium for differentiation of roots and growth of saplings is prepared as prescribed and the differentiated buds are separated by one and inoculated in it.

Then the separated buds are divided by size. The buds shorter than 10 millimetres are put in the culture medium for multiplication. The buds longer than 10 millimetres are put in the culture medium for differentiation to

strike roots and grow to be sturdy saplings. After they are cultured in this way for four or six months they are taken out of the bottle and acclimatized.

Culture for Acclimatization: The tissue culture saplings which are grown 2-4 centimetres long are taken out of the culture bottle and are transplanted to wooden box or flowerpot and hardened and cultured to be acclimatized to the environment.

This process is called acclimatization growth.

The young saplings taken out of the culture bottle may be suppressed in their growth or die because they grew provided with sufficient nutrients and saturated moisture in the culture bottle. Therefore, it is necessary to harden them gradually to acclimatize to the environment.

The saplings are transplanted for acclimatization culture as follows:

At first the saplings are taken out of culture bottle with pincette or platinum tools and agar-agar is cleanly washed away from them in tap water.

It is desirable to place the saplings on a sieve and wash away agar-agar with the help of tap water lest the leaves or roots be hurt.

After washing the saplings are laid on the clean packing paper for one or two hours so that moisture evaporates.

Then charcoal is spread in a wooden box which is 60 centimetres long, 40 centimetres wide and 10 centimetres high and sphagna are laid 4-5 centimetres thick on it and young saplings are

planted in it at the interval of 1.5-2 centimetres.

When planting saplings sphagna in the shape of a chestnut are placed for support under the stem of the sapling and after planting them in the box, the roots are covered with sphagna. Then the roots are not hurt when they are planted.

After all the saplings are planted the box is covered with a glass sheet. The temperature is kept at 18-20°C at night and at 25-28°C at daytime and light of 5,000-10,000 luxes is put on.

After they are cultured for about one week in these conditions, the glass cover is opened a little at daytime, gradually increasing the time and space of exposure.



The acclimatized tissue-cultured saplings are transplanted to flowerpot

When they are cultured for one or two months in this way, they put forth new leaves and new roots and thus are basically acclimatized.

After they are acclimatized they are cultured at 22-24°C at night and 28-30°C at daytime and at 70-80 per cent of humidity, exposed to the light of 10,000-15,000 luxes. In this period it is desirable to apply inorganic fertilizer once in 7-10 days.

OITIS VINIFERA CV. SUTSUBEN

Oitis vinifera grape was presented to President Kim Il Sung by Wata Keishu, the director of the Travel to China Company Ltd. of Japan, on March 28, Juche 71 (1982). It is a deciduous perennial vine belonging to the grape family.

The leaves are round, five-digitated and alternate. The flowers are very small and form a raceme.

The fruit is juicy and of deep lilac colour. It is widely known for sweetness as a good species.

It is propagated by planting of cuttings, grafting, and seed.

Delivering the gift plants to the officials

concerned, he said that he deemed it great honour if it would give pleasure to the respected leader His Excellency President Kim Il Sung who wanted to provide the Korean people with tasty and fresh fruit.





**The fruit and seeds
of Kimilsungia**

When young saplings are cultured for two or three months in this way, the stem and leaves of the saplings become thick and new roots grow from the bottom of the stem. Then they are transplanted to flowerpots by 5-10 plants.

PROPAGATION BY SEED

The seed of Kimilsungia has only embryo and no albumen like other orchids. Therefore, it does not germinate of its own accord by ordinary method.

Therefore, the seed is germinated and bred with the help of symbiotic bacteria or germfree culture

In order to breed by seed it is necessary to collect many good seeds.

Collection of Seeds: In natural

FRUIT AND SEED

Generally a plant bears fruit and goes to seed to leave its posterity. Once annual and biennial plants bore fruit, they dry to death and seeds alone remain. Perennial plants also produce seeds since the period of their existence is not so long. Fruit has one or several seeds enveloped with skin. The skin of some fruit consists of endoder-mis, middle coat and exine. Some seed has an embryo and albumen enveloped with seed coat; the other seed has no albumen, so nutriments are stored in a bud leaf.

In an embryo there are a young embryo which develops to be stems and leaves and a young root which grows into roots.

Ovary and torus change into a fruit; ovule goes to seed. Seeds, therefore, are contained in fruit. The fruit of dandelion has thin skin, so it looks like a seed; the seed of *Liriope platyphylla* looks like a fruit because its skin is thick.

conditions pollination is done by bees, but in the greenhouse pollination must be done artificially. It is best to do pollination in 3-7 days after flowering.

For pollination pollen masses are taken out of anther on the filament in flower by opening the lobes of anther with pincette and are dusted to the stigma. When it is pollinated properly, the flower hangs in 24 hours. The flower gets discoloured and withers in three days. The ovule noticeably swells in a week.

The fruit completely matures and begins to swell in 6-7 months after pollination.

The matured fruit contains several ten thousand seeds.

It is desirable to collect seeds before the fruit bursts.

When the fruit bursts seeds cannot be collected. Therefore, it is desirable to wrap the fruit with vinyl sack or envelope before it bursts.

The collected seeds are selected and may be planted immediately or after storing them for a certain period.

The seeds must be kept at about 5°C in a refrigerator.

When they are kept at the room temperature the rate of germination may decrease.

Germination of Seed with the Help of Symbiotic Bacteria: There

are symbiotic bacteria around the roots of the parent plant of *Kimilsungia*.

In order to germinate seeds with the help of symbiotic bacteria, at first the sphagna on the surface of flowerpot are removed as wide as the area to be sown and the new wet thin layer of sphagna is spread. The sphagna must be spread evenly so as not to allow seeds to penetrate into them. Then seeds are sown and covered with sphagna thinly.

Till the seeds germinate and put forth leaves the flowerpot must not be exposed to strong light nor given fertilizer.

Another method of germinating seeds with the help of symbiotic bacteria is to spread cloth on the flowerpot and sow seeds on it.

When seeds are sown on the cloth spread on the flowerpot the rate of ger-

IRIS ENSATA

Iris ensata was presented to President Kim Il Sung by Kamo Mototeru, in charge of the Kamo *Iris Ensata* Garden in Kakegawa City in Shizuoka Prefecture in Japan on March 30, 1982.

Iris ensata is a perennial ornamental plant belonging to the *Iris* family. It is 90-120 centimetres high and its taproots are thick and nodular and stretch sideways.

The leaves grow in clusters from the taproot and adhere to it alternately. It bears white, blue and violet flowers on the tip of flower stalks.

It grows well on the swampy land. It is mainly propagated by separating of a cluster and by seed.

He presented *Iris ensata*, the symbol of happiness, prosperity and longevity, to the respected President Kim Il Sung, wishing him a long life in good health, he said.



mination can be raised higher than by the above-mentioned method.

Seeds are sown on the cloth spread on the flowerpot as follows: The earthen flowerpot which is 12-15 centimetres deep is prepared.

Fragments of flowerpot and charcoal mixed at the ratio of 1:1 are filled up to 1/2-1/3 of its depth and sphagna are spread on them. A handful of sphagna taken from the flowerpot containing the mother plant is laid evenly on the flowerpot and rough cloth is spread flatly on them. Three or four centimetres of space is left between the rim of the flowerpot and the cloth.

The flowerpot is sufficiently watered and covered with glass or vinyl sheet and is kept in half shade for one or two days. Then seeds are sown over it.

Then seeds begin to germinate with the help of symbiotic bacteria.

The Germfree Culture of Seeds:

Generally speaking, when seeds are germinated with the help of symbiotic bacteria the rate of germination is very low and the period of germination and the period of growth after germination is very long.

Therefore, seeds are cultured in the artificial nutrient culture medium in the germfree condition.

Breeding by germfree culture of seeds proceeds through the stages of culture for germination, sapling culture and culture for acclimatization.

Culture for germination covers the process of culture ranging from inoculation of seeds in the artificial nutrient culture medium to the growth of two leaves through the formation of a pro-

HIPPOPHAE RHAMNOIDES CV. HERGO

It was presented to President Kim Il Sung by Gerhard Shroeder, the Manager of Seed and Sapling Factory of Berlin in Germany on October 17, Juche74(1985).

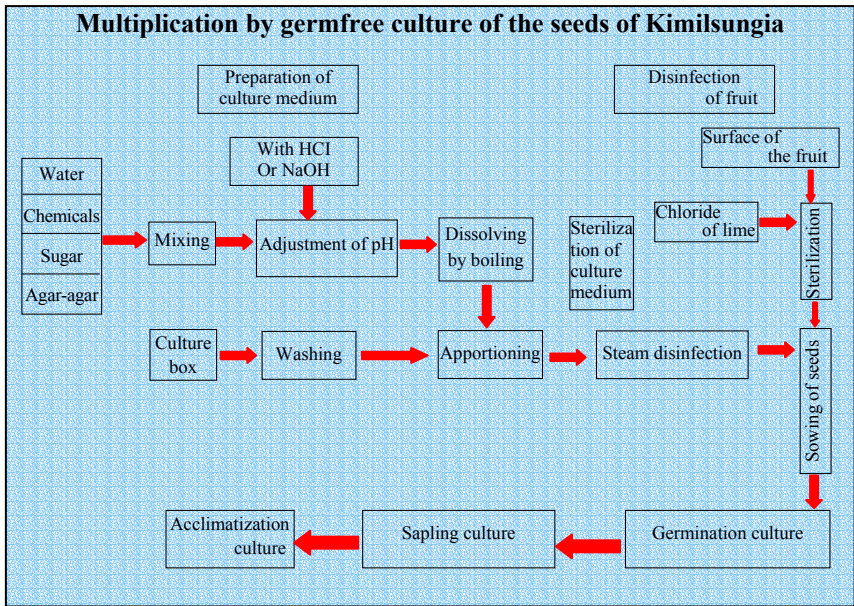


It is a deciduous shrub belonging to the *Elaeagnus* family. It is 0.5-3.5 metres high and the highest is 10-15 metres. Leaves are shaped like willow leaves and alternate.

Fruit is yellow and ellipsoidal. It bears many fruits on its branches and gives a good yield.

The fruit contains various vitamins. They are used widely as vitamin compounds and in making jam.

Shroeder asked our officials to convey to the President that he hoped this plant would help the economic development of Korea.



tocorm-like body.

There are two prescriptions for germination culture medium: Prescription for inorganic salt culture medium and that for culture medium made of inorganic salt mixed with tomato juice. Inoculation of one seed requires five litres of inorganic salt culture medium at least.

Five litres of inorganic salt culture medium are prepared as follows: At first about two litres of water is put into the vessel with the capacity of five litres and then 50 ml of the 1st-4th stored solutions each and 5 ml of the 5th solution and then the solution of alpha-naphthyl acetate of the concentration of 0.1 mg/ml are added. Then 150 grams of sugar is put and water

is added till the whole solution becomes 2.5 litres. The pH is adjusted to be 5.2. 2.6 litres of water is put in another vessel and 40 grams of agar-agar is added, which is dissolved by boiling. The pH of the solution is adjusted to be 5.2 and it is mixed with the above-mentioned culture fluid.

Before cooling the mixed solution is put into 160 bottles by 30 ml which are sterilized for 15-20 minutes under the pressure of 0.1 megapascal.

Five litres of mixture of inorganic salts and tomato juice for culture as follows: At first one litre of water is put into the vessel with capacity of five litres and then 25

ml of the 1st-4th stored solutions each and 2.5 ml of the 5th solution and one litre of tomato juice are added. Then 150 grams of sugar is put and water is added till the whole solution becomes 2.5 litres. The pH of the solution is adjusted to be 5.2.

2.6 litres of water is put in another

vessel and 40 grams of agar-agar is added, which is dissolved by boiling.

After the pH of the agar-agar solution is adjusted to be 5.2, the solution is taken in the same quantity as the culture fluid and mixed. Then it is put into the culture bottles and sterilized as

SELF-POLLINATION AND CROSS-POLLINATION

We can distinguish two types—cross-pollination in which pollens of the flower of another plant of the same species are carried to the stigma; and self-pollination in which pollens are carried from the stamens of the flower to the stigma of the same flower. Cross-pollinating flower has the features appropriate for it developed. The example is found in monoecious plants. *Coix lachryma* has the female flower matured earlier than the male flower. In *Campanula punctata*, stamens mature earlier than pistils.

Matured stamens of *Campanula punctata*



***Coix lachryma-jobi* with matured pistils**



Matured pistils of *Campanula punctata*



mentioned above.

After culture medium is prepared in this way, the surface of the fruit is disinfected for about ten minutes with 7 per cent solution of chloride of lime and split with sterile knife and seeds are inoculated into culture medium.

Seeds may be inoculated into culture medium with a *sput* sterilized in sterile water or with brush sterilized in the solution of chloride of lime.

When the fruit bursts, the seeds are disinfected for ten minutes, soaked in the 2-3 per cent solution of chloride of lime and are inoculated into culture medium by sucking and spewing them with a *sput*. In this case the rate of germination is low.

The culture bottles containing inoculated seeds are placed in the culture room, where they are cultured at the temperature of 25-30°C, exposed to the light of fluorescent lamp of 2,000 luxes for 12-14 hours a day.

After they are cultured for 90-120 days in these conditions, the grown saplings are taken out of the culture bottle with a long pincette and trans-

planted to the new culture bottles.

The same culture medium as the one for germination is used. It is desirable to plant one sapling per one square centimetre.

After saplings are transplanted to the new culture medium, they are cultured at the same temperature and in the same light conditions as in culture for germination.

At this stage of culture they may be cultured shading them with double reed blinds with the use of sunlight ranging from 1,000 to 4,000 luxes in the greenhouse instead of illuminating with fluorescent lamps. The culture bottles should not be exposed to strong straight sunlight nor be put in the place with excessively high humidity lest they should be hurt.

When the saplings put forth 3-5 leaves and roots and grow 3-4 centimetres high after they are cultured for 4-5 months in this way, they are transplanted to boxes to acclimatize them.

Culture for acclimatization is performed in the same way as the tissue culture of the growing point.

Saplings of Kimilsungia



ESSENTIALS OF CULTURE

FLOWERPOT AND CULTURE MEDIUM

Flowerpot: Earthen, plastic and porcelain pots are used for the culture of Kimilsungia.

Earthen pots are good for culture as they are porous and absorb water well and are permeable to air.

Plastic pots are clean and convenient for handling but are not permeable to air. It is desirable to use plastic pots with porous side.

Porcelain pots are heavy and inconvenient for handling but clean. They are mainly used for display.

In addition, wooden and bamboo pots are used. They are permeable to air and good for culture.

Culture Medium: As culture medium are used sphagna, the royal fern's roots, peat, fine gravels, leaf mould, charcoal, fragments of flowerpot, pumice stones and others which are well permeable to water and air, retain moisture for long and do not rot.

Sphagna have long been used as culture medium for orchids.

SWEET ALYSSUM

Sweet alyssum was presented to President Kim Il Sung by V.L. Bos, the director of the Ocean Freight Transport Agency in the Kingdom of the Netherlands

on December 20, Juche 65 (1976).

It is an annual plant belonging to the *Brassica* family.

It is a small and fast-growing flowering plant.

Its leaves are shaped like willow leaves. It branches abundantly and bears tens of flowers. The flower stalks come forth from tip of the stalk and bear many small flowers which bloom consecutively, going upward.

The flowers are white or light violet and very aromatic. It is propagated by seed. It blooms early and long. It is widely planted in flower gardens as an ornamental plant.





Interior of the Kimilsungia Greenhouse

Sphagna occur, forming a colony, mainly in swamps, at the foot of hills, in forest which is damp. There are over ten varieties of sphagna. The big sphagna are most suitable for culture medium.

The royal fern's roots are hairy roots 1-1.5 millimetres thick and 10-20 centimetres long. They are stiff and of dark maroon colour.

It is desirable to use the upper layer of peat which originated from sphagna. The upper layer of peat is retentive of water and resilient. It does not drain well. So it is desirable to use it mixed with proper quantity of sphagna or the royal fern's roots.

When fine gravels, fragments of flowerpot or pumice stones are used as culture medium, the roots almost never rot.

Barks of fir and *Abies nephrolepis*, charcoal, and crumbly broad leaves are

also suitable for culture medium.

TRANSPLANTING OF SAPPLINGS AND CHANGE OF FLOWERPOTS

Accessories and Preparation of Flowerpots: Accessories, chemicals and materials for flowerpot must be prepared for transplanting of sapplings and change of flowerpots.

Shears, pincette, bamboo knife and small hammer must be prepared as accessories.

As for shears pruning shears and surgical shears are used. Pruning shears are used to cut dried stalks and rotten roots, while the surgical shears are employed to trim roots and cut the cord for prop. A pincette which is 15-20 centimetres long is suitable. It is mainly used to remove old culture

medium around roots and apply chemicals.

A bamboo knife is made of bamboo stem 20-25 centimetres long and 1.5-2 centimetres wide the end of which is sharpened. It is mainly used to remove the old roots adhering to the flowerpot when changing the flowerpot or to plant saplings.

A small hammer is used to shatter the fragments of flowerpot to be of proper size or to set props.

As for chemicals sulphur powder, three per cent solution of copper sulphate and five per cent solution of lime-sulphur compound must be prepared.

As for the materials for change of flowerpots, flowerpots, sphagna, or other culture medium, props and cord

must be prepared.

It is desirable to use the flowerpot after soaking it in water one day beforehand. Sphagna and other culture medium are used after soaking them in water and squeezing water out of them.

As for props, it is advisable to use bamboo, plastic or glass sticks.

Transplanting of Saplings: Tissue-cultured saplings must be habituated to box and then transplanted to flowerpot. It is advisable to transplant the tissue-cultured saplings to the earthen flowerpots with sphagna as culture medium.

The flowerpot which is 7-9 centimetres across is planted with 3-4 saplings, while the flowerpot 13-15 centimetres across is planted with 8-10 saplings.

Materials for the change of flowerpot





The plant is removed from the flowerpot to be transplanted in another flowerpot

Before transplanting saplings to flowerpot the fragments of flowerpot or fine gravels are laid on the bottom of the flowerpot to 1/3 of its height, charcoal is spread over them in one or two layers and then sphagna are spread evenly.

The saplings which are small and have short roots are planted by sticking the roots in after digging up sphagna with bamboo stick. The saplings which are tall and have developed roots are planted by laying sphagna under the roots for support and moulding up the roots with them.

The saplings planted in the same flowerpot should be similar in height.

After transplanting saplings the culture medium around saplings are hardened by hand so that the roots contact sphagna well and then watered a little. The flowerpots are

placed in a shady place and tended for about a week.

Change of Flowerpots: The roots grow and fill the flowerpot and leaves touch each other in about one year after tissue-cultured saplings are transplanted to flowerpot. Then the flowerpot must be changed.

It is advisable to change flowerpot in spring while new shoots come out and grow before new roots strike.

Before changing flowerpot the roots adhering to the wall of the flowerpot are taken away by bamboo knife and the plants are removed. The plants are examined and rotten roots and leafless shrunken stems are cut away with shears and sulphur powder is applied to the lesion.

Then roots are spread wide so as not to gather and sphagna are put in a shape of a chestnut for support under

the stem and then the plant is put into the flowerpot and is covered with sphagna.

When transplanting the plant into flowerpot it is advisable to plant it in such a way that the new shoots lie in the central part.

Sphagna are laid in such a way that the neck of the root is somewhat exposed and depression is formed around it for convenience for watering.

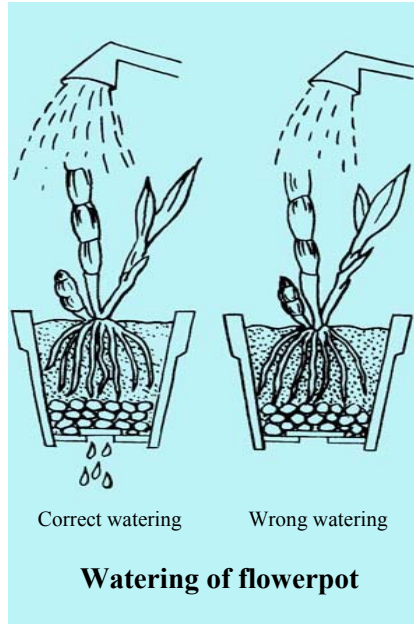
The space of about one centimetre is left between the rim of flowerpot and culture medium for convenience for watering.

WATERING

Watering is a very important operation in tending plants. Whether the plant grows healthy or not depends on watering.

A main cause of failure of cultivation of Kimilsungia is improper watering which causes the roots to rot.

The original breeds of Kimilsungia grew lacking in constant water supply with its roots adhering to the



Watering of flowerpot

stem of a tree or exposed to the air. Therefore, its roots are thick and have developed water-retentive tissue and the plant is resistant to drought.

Owing to this quality Kimilsungia survives for long without

One year old sapling after tissue culture



Two years old sapling after tissue culture



being watered and even when uprooted, it does not immediately wither.

So it must be watered in such a way that a distinction is drawn between wet and dry conditions.

For the purpose watering should be done considering well the environment of one's greenhouse, the state of the plants and season.

The quality of water to be sprayed at a time must be such that water trickles from the bottom of the flowerpot. Next, water is sprayed when culture medium seems to be dry. It is because only when water is sprayed when culture medium is dry the old air in the flowerpot is replaced with fresh one and the roots grow well.

At first it is difficult to judge the extent of dryness of culture medium but it can easily be judged when one

becomes gradually skilled.

Kimilsungia requires watering even in the period of wintering. It is generally advisable to water one or two days after the surface of culture medium becomes dry.

In summer temperature is high and it is the season of growth. It dries fast, so watering at times is required every day. In this period the roots do not rot.

From autumn the plant should not be often watered.

It is advisable to spray water in the forenoon on fine, day. As for the quality of water, rain water obtained in the rainy season is ideal, but it is impracticable. Well water or river water which is neutral or somewhat acid is good. It is advisable to use tap water after keeping it in a tank for a certain time.



Three years old sapling after tissue culture

APPLICATION OF FERTILIZER

The original breeds of Kimilsungia were supplied with very scanty quantity of inorganic matter in the place of origin and very slowly grew, flowered and bore fruit.

In this condition the growth of orchids is very slow. It takes 4-5 years or more for saplings to flower.

Therefore, in order to expedite the growth of Kimilsungia and shorten the period of growth up to flowering it is necessary to apply fertilizer.

Application of Inorganic Fertilizer: As for inorganic fertilizer it is

desirable to apply mixture of nitrogenous, phosphate and potash fertilizers. As for magnesium and calcium natural supply of them is sufficient.

In order to make solution of mixed fertilizer 2.4 grams of urea, 4 grams of super phosphate of lime and 0.8 grams of potassium sulphate are put into 10 litres of water (one bucket). After one fertilizer is completely dissolved another fertilizer must be added.

Much fertilizer is applied in the period of vegetative growth in spring and summer when new shoots grow vigorously and gradually little fertilizer is applied after transition to reproductive growth. Fertilizer may not be applied

during wintering.

Quantity of fertilizer given at a time differs with the size of flowerpot. Sufficient quantity should be given till water trickles from the bottom of flowerpot.

Frequency of application of fertilizer differs with culture medium. It is desirable to apply fertilizer at the interval of 2-4 days in the culture medium which absorbs little fertilizer like gravels. When sphagna are used as culture medium it is advisable to apply it at the interval of one week.

When peat is used as culture medium fertilizer is applied at such intervals as when sphagna are used as culture medium. When the roots of the

Prescription for Preparing 10 Litres of Solution of Three Kinds of Fertilizers

Fertilizer	Urea	Superphosphate	Potassium sulphate
Quantity (gram)	2.4	4.0	0.80

GARDEN VERBENA

Garden verbena was gifted to President Kim Il Sung by V.L. Bos, the director of the Ocean Freight Transport Agency in the Kingdom of the Netherlands on December 20, Juche 65 (1976).

It is an annual plant which belongs to the verbena family.

It grows about 15-40 centimetres high. Its branches form a large cluster, stretching sideways. Its leaves are ovate and opposite.

The flower stalks come forth from the tip of stem and bracts and bear clusters of tens of white, pink or yellow small flowers in spike inflorescence. The flowers last till it frosts. It is propagated by seed and planting of cuttings.



royal fern's roots or pumice stones are used as culture medium fertilizer is applied with middle frequency between that for the case of gravels and that for the case of sphagna.

When applying fertilizer it is desirable to spray much water in the flowerpot once in a month so as to wash down the fertilizer remaining in the flowerpot.

Application of Organic Fertilizer: Bean cakes and bone powder are used as inorganic fertilizer. Bean cakes and bone powder are mixed together or are used separately. Bean cakes and bone powder are mixed at the ratio of 1:1 or 2:1. Water is added to the mixture, which is kneaded into doughs two centimetres across and dried in the sun. They are placed on the culture medium opposite to new shoots so that they dissolve little by little when watering.

Solution of manure may be applied to increase the effect of organic fertilizer. In this case five litres of water is added to one kilogram of bean cakes and bone powder mixed at the ratio of 1:1, which is left to decay for a certain period (one month in summer and 2-3 months in winter). The solution is diluted one hundred times and applied 2-4 times in a month.

EXTERMINATION OF DISEASE AND HARMFUL INSECTS

Diseases

Smut: Smut occurs when saplings



Spray of disinfectant

are kept at very high moisture after the tissue-cultured saplings are transplanted to flowerpot. At first small black specks appear on the stalk and gradually spread to the whole plant, which is reduced to jelly and rots. This disease is caused by the fungi belonging to the pythium genus. In order to prevent this disease it is necessary to ventilate often the greenhouse lest humidity in the greenhouse is not too high, and spray water in an appropriate manner.

When the disease occurs among some saplings in the same flowerpot, the diseased saplings and sphagna around them are immediately removed and replaced by new ones. When the disease occurs on the full-grown plant the diseased part is cut away and the lesion is disinfected with chemicals.

Anthracnose: Anthracnose occurs on leaves. At first small maroon specks appear and gradually spread in the shape of dark ring.

The diseased specks often occur at the tip of leaves at first and then

extend to the whole leaves, which wither and dry.

The disease is caused by the fungi belonging to the gloeosporium genus.

The disease often occurs when temperature and humidity are high and illumination is weak.

If the disease occurs the affected part is cut away and burned.

Softening and Rotting of Leaves and Stems: This disease causes the leaves and stems to soften and rot. Diseased spots like scald appear on the stems and leaves at first and then rapidly spread to the whole stems, which become black.

The disease is mainly caused by the bacteria belonging to the erwinia genus.

The bacteria find themselves in culture medium and propagate at high temperature and at very high humidity. They penetrate into the plants through the part injured during transplantation.

Therefore, this disease can be fully prevented when the plants are kept somewhat dry without watering and well ventilated after transplanting.

Mosaic Disease: When the flowering plant is attacked by this disease, maroon specks appear on the leaves and stem and then become black, spreading in an indeterminate form, and cause the leaves to wither.

The disease is caused by a sort of diplodia.

In many cases this disease occurs together with physiological impediment due to improper watering and fertilization and poor control of temperature.

Particularly the disease is liable to occur in spring and autumn when temperature is low and moisture is high.

When the plant is attacked by this disease it suffices to apply disinfectant several times.

Root-rot Disease: This disease occurs when water does not drain well around the roots, air does not well penetrate into the flowerpot and the culture medium is always wet.

When the plant is affected by this disease, the roots rot and the leaves and stem become yellow and curl up. The disease is caused by the fungi belonging to the fusarium genus and rhizoctonia genus.

When the plant is attacked by this disease, the diseased plant is taken out of the flowerpot and the rotten part is removed and the lesion is disinfected and the plant is transplanted in a clean flowerpot so that water drains well.

Virus Diseases: There are several kinds of virus diseases. Generally speaking, when the plant is attacked by these diseases, mosaic, striped or ring-shaped patterns appear.

METHOD OF POLLINATION

The method of pollination differs from plant to plant. In *eulalia* and *Alopecurus var, amurensis* pollens are carried by wind, so those flowers are called wind-pollinated flowers. In these flowers the pollen sac is outside flower so that pollens can catch wind easily. The plants of *Leguminosae* and *Rosaceae* are called insect-pollinated flowers because their pollens are transferred by insects.

As for *Dunbaria villosa* when an insect perches on the stamen it bends down so as to be stained with pollens. *Hydrilla verticillata* and *Ottelia alismoides* are called water-pollinated flowers because their pollens are moved by the help of water. As the male flower of *Hydrilla verticillata* is ripe it drops and flies near to the female flower. Camellia, in which pollens are transferred by a bird, is called a bird-pollinated flower.

Kimilsungia belongs to a bird-pollinated flower.



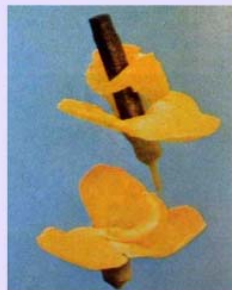
The male flowers of *Hydrilla verticillata*



The female flowers of *Hydrilla verticillata*



The stamens of *Dunbaria villosa* entwining insects



They are also responsive to the stick

The affected plant grows poorly and bears small flowers, which are not only deformed but do not last long.

In order to prevent these diseases the plant should not be injured and tools must be disinfected before use. The affected plants are isolated. The species is preserved by getting generation free from virus by the method of culturing the growing point.

HARMFUL INSECTS

Tetranychus sp.: When the plant is attacked by these insects, white spots appear with the decrease of chlorophyll in the leaves and the whole leaves gradually become yellow and fall. In serious cases new shoots and flowers

are injured.

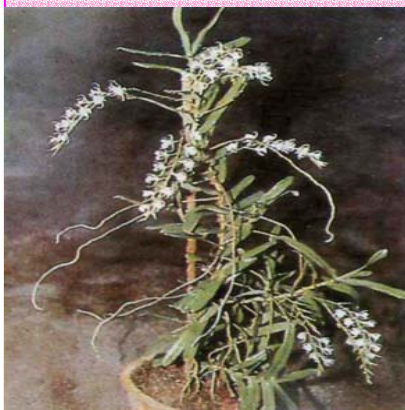
These insects propagate vigorously in the places where temperature is high and which are dry.

When nicotine sulphate and other insecticides are applied alternately at the early stage of attack, the damage can be prevented.

Beetles: These insects mainly live off the leaves and suck the sap. The young larvae are yellow and 0.5 millimetres long. The female larva grows within the shell, while the male larva gradually grows and casts the shell. The female larva lays several hundred eggs within the shell. When the young larvae hatch from the eggs the mother larva dies. Beetles usually breed 3-4 times a year. In order to exterminate beetles 2,000 times

OEONIA ONCIDIFOLIA

It was presented to President



Kim Il Sung by President Didier Ratsiraka of the Democratic Republic of Madagascar on September 7, Juche 67 (1978). It is a perennial plant belonging to the orchid family.

It is about 30-50 centimetres high. Leaves are alternate and differ in size. About five flower stalks come forth from each stem. Each flower stalk bears 12-20 flowers, which emit fragrance at night.

Its specific feature is that it has developed aerial roots which are 15-20 centimetres long.

solution of phosphamide or 800-1,000 times solution of metaphose is sprayed.

As the egg-laying period of beetles is long, chemicals are sprayed 3-4 times at the interval of 7-10 days in summer.

Five per cent solution of lime-sulphur compound may be sprayed before new shoots come out in early spring.

Thrips: Thrips are tender and small worms whose body is one millimetre long and yellowish maroon or dark maroon. Many of them occur in summer.

Their images and larvae all attack leaves, new sprouts, flower buds, flowers and the outer layer of tissue or suck the sap. Many whitish spots appear in the injured part, so it is poor-looking.

Thrips are liable to occur when it is dry in the greenhouse. So moisture must be well adjusted in the greenhouse.

Nicotine sulphate, compound of *Chrysanthemum cinerariaefolium*, diazinon and others are used as disinfectants.

Black-winged Mushroom Fly: The imago is a 1.5-2 millimetres long fly with black wings. It does not directly harm the plants.

It is its larvae that directly harm the plants.

The young larvae which hatch out of the eggs are 2 millimetres long and 0.5 millimetres thick and whitish. They have black spots on their head. Larvae mainly attack the roots of saplings. When these insects occur, 800 times solution of diazinon or 1,000 times solution of phosphamide is sprayed. When larvae are not completely exterminated, it is effective to disinfect the plants by spraying the solution of chemicals over the flowerpot little by little.

Snails: Snails cut and eat the leaves of saplings and new shoots or crunch new roots and flower buds and do much harm. Among snails those which do much harm are grey snails with feelers on the head.

Grey snails hide themselves beneath the flowerpot or under stones at daytime and come out and do harm to the plants at night.

Adult and young snails winter in the soil or near the neck of the roots of the plants. It is effective to catch them at night with the help of the light of a flashlight.

Small shell snails which are 5-7 millimetres across crunch new roots. When sphagna are used as culture medium, these snails live in the culture medium and do harm to the roots of the plants.

Chart of tending of Kimilsungia by seasons

Seasons Division	Spring			Summer			Autumn			Winter		
	3	4	5	6	7	8	9	10	11	12	1	2
Growth	Germination of new shoots			Vegetative growth			Growth of flower stalk			Flowering		
Temperature (degrees)	Lowest temperature 18-12°C degrees			Highest temperature 28-30°C degrees			Lowest temperature 18-20°C degrees			Lowest temperature 14-15°C degrees		
Shading of light	30-40 percent			60-70 percent			30-40 percent			30-40 percent		
Humidity of air	60-80 percent			60-80 percent			60-80 percent			60-80 percent		
Ventilation	Door	Opening of window at daytime		Opening of window at night and daytime			Opening of window at daytime		Opening of side window		Ventilation by the door	
Watering	Once in 2-3 days			Once in 1-2 days			Once in 2-3 days			Once in 4-5 days		
Application of fertilizer	Once or twice in one month			3-4 times in one month			Once or twice in one month			Not applied		
Checking of diseases and harmful insects	Land snail <i>Tetranychus sp.</i>			Beetle Root-rot disease			Mosaic disease Virus			<i>Tetranychus sp.</i>		
Work	Change of Flowerpot						Planting of upper shoots			Setting of vinyl sheet		
							Setting of props			Setting of blind		

They are not easily found. It is effective to dig up culture medium and kill them.

Tablets of metaldehyde are used to kill snails. 1-2 grams or 5-10 tablets of metaldehyde per one square metre are scattered over the whole surface of the pot.

When there is water where tablets of metaldehyde are scattered the chemical soon loses its effect. So the tablets are scattered at night and are taken back the next day when watering.

As snails occur in the dark and wet places, exposure to sunlight and ventilation must be done properly.

TENDING OF FLOWERS AT HOME

When one has good knowledge of the biological characteristics of Kimilsungia, one is fully capable of bringing it into flower at home.

In order to bring Kimilsungia into flower at home the plants which put forth new shoots in spring are brought and placed at the windowsill. When temperature rises over 15°C at night, the plants are placed on verandah or out of doors.

As the plants are exposed to strong straight sunlight their leaves may burn, so it is desirable to shade them from the strong sunlight with a rubber tree or foliage plants. In this condition the stems grow vigorously in summer. When temperature in the open air falls beneath 15°C in autumn, the plant is brought into the room and placed at the windowsill. When it is dry in the room, the flower buds which were coming out become yellow and may fall. So it is desirable to place the flowerpot in the middle of a large tray over which fine gravels or sphagna are spread and which is filled with water. In addition, different kinds of foliage plants are placed around the flowerpot so as to increase humidity there.

When Kimilsungia is tended in the room in winter, it is desirable to place it on the windowsill in the east or in the southeast. Then it is sufficiently

exposed to the morning sunlight, which is favourable for vegetative growth.

In order to bring Kimilsungia into flower in the room in April the flowerpot of Kimilsungia is placed in the glass culture box put at the windowsill. It is desirable to culture it at over 20°C at night and at over 28°C at daytime and at 60-80 per cent of humidity.

In case of its culture in the room sufficient water is sprayed and again is given after culture medium in the pot is dry as in the greenhouse. It is desirable to spray water often over the leaves because it is drier in the room than in the greenhouse.

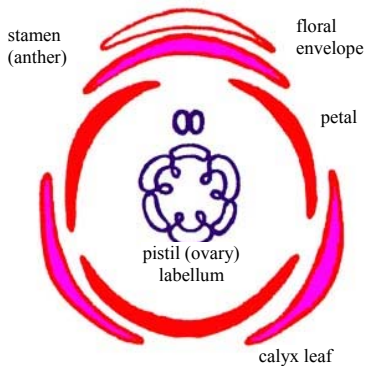
Fertilizers are applied as in the greenhouse.

Particularly the room must be often ventilated so that the plants always grow in the fresh air.



FLORAL PATTERNS AND FLORAL FORMULAE

FLORAL PATTERNS OF KIMILSUNGIA



Floral formula  flower stalk
 $\uparrow Ca_3 CO_3 [A_1 G (6)]$

A vertical projection of a flower expressing briefly the arrangement and number of the parts of a flower is called floral patterns.

As a method of expressing the number and arrangement of the parts of a flower, floral formulae have been derived.

The floral pattern and floral formula of Kimilsungia are given below.

$\uparrow Ca_3 CO_3 [A_1 G (6)]$

Here arrow indicates an irregular flower, *, a regular flower. Ca represents calyx leaf; CO, petal; A, stamen; G, pistil; a figure marked after each indicates the number of parts. Bar above the figure indicates inferior ovary and bar beneath the figure, superior ovary.



Kimilsungia which the Indonesian embassy in Korea sent to the First Kimilsungia Show

THE FLOWER CONTINUES TO BLOOM THROUGH THE FOUR SEASONS



It is an ardent desire of all florists and flower fanciers to have Kimilsungia bloom beautifully through the four seasons.

In the greenhouse condition of Korea Kimilsungia comes into bloom in late autumn or in early winter.

However, with the knowledge of flowering habit of Kimilsungia it is possible to bring it into flower in four seasons with application of different methods of control of flowering.

Kimilsungia is a shortly diurnal plant. The characteristic feature of Kimilsungia is that it bears flowers when new stems grow to a certain length even without going through the necessary temperature stage. Therefore, if the time of growth of new shoots is adjusted, it is possible to grow them as new stems and bring flowers into bloom in the required period.

The time of growth of new shoots is adjusted by temperature, separation of new buds (by removing the first new bud and making a new bud grow again) and treatment with growth control matter. These methods are not always applicable.

It is advisable to apply the method of control by temperature in spring, the method of control by separation of new buds between May and August, the method of growing new buds by the treatment with

growth control matter between November and February of the following year.

It is also possible to adjust the time of flowering by treating the old stems which bore flowers in the previous year with growth control matter.

The old stems which bore flowers in autumn have green old leaves and 4-5 lateral buds which grew to a certain extent and are in a dormant state in the bracts although flower stalks are dried. These lateral buds rarely sprout in the autumn of the following year. If these lateral buds are treated with growth control matter, the dormant lateral buds may grow to be flower stalks. So it is possi-

The flower stalks which came forth after the treatment with 6-BA



ble to make them bear fine flowers in any time without growing new stems.

IN ORDER TO FLOWER ON THE NEW YEAR'S DAY

Kimilsungia, if it is grown in the ordinary greenhouse in Korea, it is in bloom on the New Year's Day without adjusting flowering.

If the flowering plants which were in bloom between October and December in the previous year and those which are not in bloom because of insufficient vegetative growth are kept at 14-15°C at night and 20-25°C

at daytime and watered in such extent that the flowerpots do not dry, they sleep. If they are kept at 18-20°C at night and at 25-30°C at daytime beginning with February or March, new shoots come out from the lower part of the stem of the previous year.

New shoots grow slowly in the beginning. When the leafless stem grows 9-10 centimetres long, incomplete lower one or two leaves come out. Then the root grows from the lower part of the new stem. When the root comes out in summer, the stem grows rapidly and 6-8 leaves come out one after another.

The flower stalk comes out at the tip of the full grown stem in

SCALLOPED SALPIGLOSSIS

Scalloped salpiglossis was gifted to President Kim Il Sung by V.L. Bos, the director of the Ocean Freight Transport Agency in the Kingdom of the Netherlands on December 20, Juche 65 (1976). It is an annual plant belonging to the *Solanaceae* family.

It grows about 40-75 centimetres high and its stem is straight. The stem is covered with many fine hairs and its leaves are alternate. The flowers bloom consecutively, going downward from the tip of stem.

It bears clusters of reddish orange,

yellow, green and red flowers. It is mainly propagated by seed.



September or October and flowers bloom between November and January.

Therefore, in order that Kimilsungia is in bloom on the New Year's Day, temperature in the greenhouse must be adjusted to be not too high in winter so that new shoots come out somewhat late in spring and the flower stalk comes out and the flowers bloom after sufficient vegetative growth in early autumn. As flower buds come out with the growth of flower stalk and flowers bloom in late autumn or in winter it must be seen that the temperature and humidity in the greenhouse do not fall.

Particularly when the greenhouse is heated humidity there

may decrease.

So the floor of the greenhouse and the flowerpot stands must be sufficiently watered to secure sufficient humidity so that many flowers come into bloom.

IN ORDER TO FLOWER ON THE FEBRUARY FETE DAY

In order to have Kimilsungia bloom on the 16th of February, Comrade Kim Jong Il's birthday, it is desirable to delay the coming out of new shoots by keeping the plant at low temperature and adjust flowering by separating shoots.



On the morning of the New Year's Day

In the ordinary greenhouse in Korea new shoots come out in spring and flowers bloom in autumn or in early winter. When flowers are made to come out somewhat late, it is possible to have *Kimilsungia* full-blown on the fete day of February.

For the purpose, the plants from which flowers are cut for the fete day of January of the previous year and the plants which did not flower because of insufficient vegetative growth are selected separately and are kept at 14°C at night and watered little by little so that flowerpots do not dry. Then

new shoots do not come out early in spring and the plants are in dormant state.

When temperature falls below 13°C at night and the plants do not entirely exposed to sunlight, the stems wrinkle and leaves become yellow and fall because nutrients consumed during sleeping are not replenished.

Therefore, they must be exposed to sunlight in an appropriate measure and temperature regulated so that photosynthesis, though slight, takes place in a certain measure, during sleeping.

After sleeping the plants are grown at high temperature (the

PAPHIOPEDILUM KIRSANTHUS

It was presented to President Kim Il Sung by President Didier Ratsiraka of the Democratic Republic of Madagascar on September 7, Juche 67 (1978). It is a perennial plant belonging to the orchid family.

It has no stem and puts forth several fascicular leaves right and left.

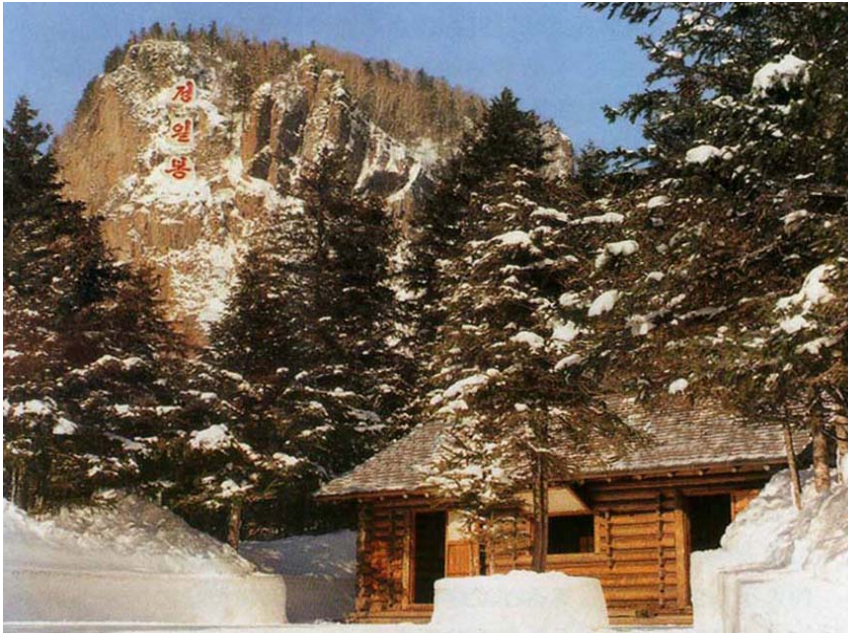
Its leaves are deep green, cuticular and have markings.

The maroon flower stalk comes forth from the bracts of fascicular leaves and bears one flower on its tip.

It has a three-parted perianth and a

pouch-like labellum. The flower is of light green colour with maroon markings. It is propagated by the separation of a cluster and by seed culture.





The log hut in the secret camp on Mt. Paektu where Comrade Kim Jong Il was born

lowest — 22-24°C, the highest — 28-30°C) beginning with May. When 70-80 per cent humidity is secured at this temperature, new shoots come out and grow in the lower part of stem in June or July. The new shoots which come out in summer grow 40-50 centimetres long in five months. As summer lasts for three months, in autumn vegetative growth may slow down.

Therefore, only when high temperature and humidity are secured till December like in summer and supplementary illumination is done for 2-4 hours a day from mid-September, vegetative and reproductive growth becomes sufficient and beautiful flowers bloom in January

or February in the following year.

The higher is the intensity of illumination, the better is supplementary illumination. It is desirable to install one or two 40-watt fluorescent lamps per one square metre of flowerpot stand.

In order to make *Kimilsungia* bloom in mid-February by the method of separating shoots, plants in good vegetative condition are selected from among the plants which put forth and grow new shoots early in spring and sturdy new shoots are separated from them in May or June. Then new shoots again come out and grow vigorously from other eyes in the lower part of stem in a month because in this period the

temperature and humidity in the greenhouse are appropriate for germinating.

When the new shoots sprouting in summer are kept at the appropriate temperature, humidity and illumination as mentioned above, it is possible to make flowers bloom in January or in February.

IN ORDER TO FLOWER ON THE SUN'S DAY

It is difficult to make *Kimilsungia* bloom in April by ordinary method because of the

specific feature of its growth. In order to make *Kimilsungia* bloom on the Sun's Day, it is necessary to apply the different methods of adjusting flowering.

In order to make *Kimilsungia* bloom in April, it is necessary to make new shoots sprout in August or in September instead of in spring and the stem and leaves come out and grow in winter.

In other words, it is necessary to change the growth cycle of *Kimilsungia* in the greenhouse condition.

For the purpose, the plants from which flowers were cut and used in February and April in the previous year are kept at low temperature and exposed

EVERGREEN CANDYTUFT

Evergreen candytuft was presented to President Kim Il Sung by V.L. Bos, the director of the Ocean Freight Transport Agency in the Kingdom of the Netherlands on December 20, Juche 65 (1976). It is a perennial plant belonging to the *Brassicaceae* family.

It grows about 20-25 centimetres high. Its leaves are shaped like the willow leaves and round on the tip.

The flower stalks come forth from the tip of stem, bracts or the neck of the root and bear white, pink and deep pink beautiful flowers in umbel inflorescence.

It is propagated by seed, planting of

cuttings and separation of cluster.





**The old home in Mangyongdae where
President Kim Il Sung was born**

to little light and the flowerpots are almost not watered. Then new shoots do not come out and the plants continue to sleep.

Kimilsungia has developed water-retentive tissue and is resistant to drought. Even if it is not watered for half a month, it does not suffer. In order to make new shoots come out late, it suffices not to water the plant even if temperature rises a little.

If the plant is grown, placing it in a place at high temperature and watering it properly beginning with July after keeping the flowerpot dry,

new shoots come out on the lower part of the stem of the previous year in August or in September. When these shoots are grown in autumn and in winter, the flowers will bloom in April in the following year.

It is possible to make the stem from which new shoots sprouted in early spring and grew 20-30 centimetres long till July put forth new shoots again and bear flowers in April of the following year.

For the purpose, the tip of the growing stem is cut off. When the tip of the growing stem is cut off, new shoots again come

out and grow from the axillary buds in the lower part of the growing stem in a month. If these shoots are grown, flowers will bloom in April in the following year.

When coming out of shoots is delayed or the tip of stem is cut off in this manner, all the new shoots come out in summer or in autumn and vegetative growth and reproductive growth proceed in cold winter. So temperature, humidity and illumination conditions are more disfavoured than in natural condition, and vegetative growth is insufficient and flowers may not bloom in plenty.

Therefore, it is important to make temperature, humidity



Kimilsungia the eye on the upper part of the young stem of which was treated with 6-BA

TRICOLOR CHRYSANTHEMUM

This was presented to President Kim Il Sung by V.L. Bos, the director of the Ocean Freight Transport Agency in the Kingdom of the Netherlands on December 20, Juche 65 (1976). It is an annual plant belonging to the chrysanthemum family.

It is about 40-60 centimetres high. Leaves adhere to the stem alternately and spread like a feather.

It bears white, red or yellow flowers by one in capitulate inflorescence on the tips of the flower stalks. A coloured ring is formed around the pistil and stamens,

which presents a spectacular sight. It is propagated by seed.



and exposure to light approach that of summer respectively so as to secure sufficient growth.

If we apply the method of making the old stem which once bore flowers bear flowers again, we can make flowers bloom on the fete day of April. The old stems which once bore flowers between late December and early January and the plants which did not bear flowers because of insufficient vegetative growth are selected and three centimetres long fine cut is made near the eye at the tip of the stem or axillary buds and the cut is smeared with lanolin ointment mixed with 0.25-0.5 per cent benzyl adenine.

When the plant treated with benzyl adenine is kept at 20-23°C at night and at 28-30°C at daytime and at 70-80 per cent humidity in the greenhouse, a flower stalk comes out from the tip of stem in a month. The flower stalk grows and bears flower buds in two months, which come into flower in March or in April. It is desirable to lower temperature and humidity a little when flower stalks grow one centimetre long. When temperature and humidity are too high, flower stalks at times change and develop into shoots.

If the concentration of benzyl adenine is not adjusted properly and if the environment is not properly controlled

HELIPTERUM ROSEUM

This flower was gifted to President Kim Il Sung by V.L. Bos, the director



of the Ocean Freight Transport Agency in the Kingdom of the Netherlands on December 20, Juche 65 (1976). It is an annual plant belonging to the chrysanthemum family.

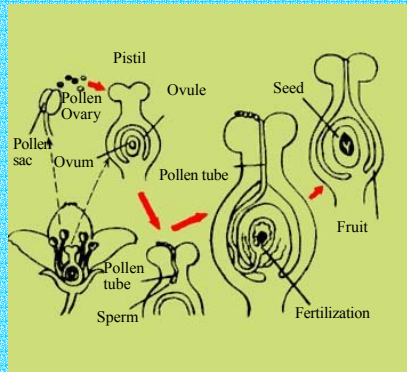
It grows 40 centimetres high and its stem is straight.

The leaves are shaped like elongated willow leaves and grow from the stem alternately in a cluster. It bears white, pink and light pink double flowers by one on the tips of stalks. It is propagated by seed.

FROM POLLINATION TO FRUIT

A flower has pistils and stamens. At the lower part of the flower is an ovary, in which there are ovules and embryo-sac. Stamen has an anther, in which pollens are formed. The contact of pollen with the stigma of pistil is called pollination. After pollination, pollen tubes are formed in pollen and go into pistils. A spermatid nucleus formed in the pollen tube goes into the embryo-sac through the ovule and is bound with an ovum. This is called fertilization. At that time, in case of angiosperms, an ovum and two polar-nuclei are formed in the embryo-sac; two spermatid nuclei are formed in the pollen tube; one is united with an ovum and the other, with the two nuclei. The

ovum develops into an embryo of seed; nuclei, into the albumen. After fertilization ovule becomes a seed and ovary becomes fruit.



when flower buds differentiate, deformed flowers may come out.

Therefore, in order to make Kimilsungia bloom beautifully on the Sun's Day it is necessary to control nutrition and culture environment creditably.

If we carefully tend Kimilsungia on the basis of its biological nature, we can make it bloom beautifully on the Sun's Day and give people pleasure.

IN ORDER TO FLOW- ER IN SUMMER

In order to make Kimilsungia bloom in summer, new shoots ought to be forced to come out in early spring. In the ordinary greenhouse new shoots usually come out in March or May. New shoots ought to be forced to come out between December

of the previous year and January or February of the following year. When new shoots come out and grow in winter in this way, it is possible to make flowers bloom in summer. For the purpose, the plants from which flowers were cut for use in August or September are selected and made to sleep and then are kept at high temperature (22-24°C at night and 28-30°C at daytime) with supplementary illumination from November.

When temperature, humidity and illumination are kept in winter as in summer, new shoots will come out and grow and flowers will bloom before their season.

When apical and lateral eyes on the stem from which flowers were cut for

use in January or February are treated with lanolin ointment mixed with 0.25-0.5 per cent benzyl adenine, flowers will bloom in summer.

The eyes ought to be treated with lanolin ointment mixed with benzyl adenine about three months before the date on which flowers are to bloom.

In order to make flowers bloom in July, fine cut is made near the apical or lateral eye and the lesion is treated with lanolin ointment mixed with benzyl adenine. Then flower stalks will come out in May and flowers will bloom in July.

Even when eyes are treated with benzyl adenine in the same period, the date of coming out of flower stalks and flowering may differ from each other due to different reasons. If treatment with the chemical is done in three or four stages at the interval of 20-30 days from early March, flowers may be made to come into bloom at different times between June and August.

Embroidery Kimilsungia



IN ORDER TO FLOWER IN AUTUMN

It is not difficult to make *Kimilsungia* bloom in autumn.

METHOD OF PROPAGATION OF FRUIT AND SEED

When fruit or seeds sprout they do not gather densely in one place but spread widely at proper intervals. The fruit and seeds of dandelion and *Dioscorea japonica* are carried far away by the wind; the fruits of *Achryranthes japonica* and *Xanthium japonicum* are propagated by sticking to a passerby's clothes or the body of an animal. As their fruit burst out the

seeds of *Corydalis incisa* and *Impatiens textori* are scattered all round to propagate. The fruit of *Swertia veratroides* and *Gentiana scabra* propagates in such a way that only its upper part is torn and seeds come out from it bit by bit every time it shakes in the wind.

The seeds of *Kimilsungia* are propagated widely by the wind.

Wind-carried seeds



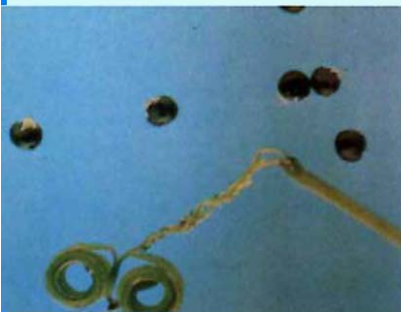
The fruit of dandelion

Seeds scattered from the split fruit

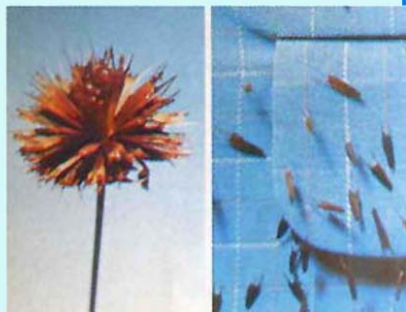


The fruit and seeds of *Dioscorea japonica*

Seeds propagated by sticking to clothes



The fruit and seeds of *Corydalis incisa*



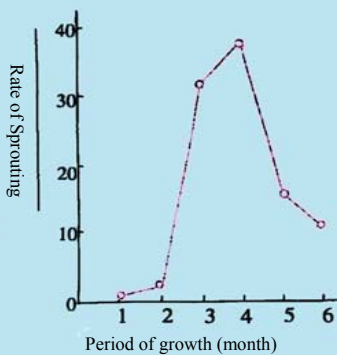
The fruit of *Bidens tripartita* var. *hebecarpa*

COMMON GLOBOSA

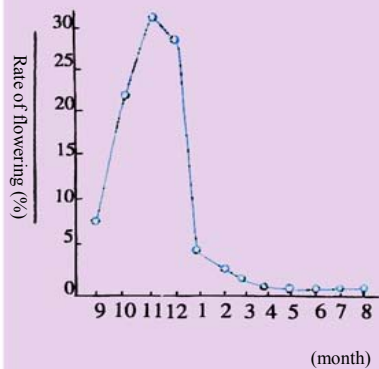
Common globosa was presented to President Kim Il Sung by the Union of Okkaki City Dietmen for the Promotion of Friendship between Japan and Korea in Japan on April 13, Juche 67 (1978). It is an annual plant which belongs to amaranth family. It is 30-40 centimetres high and grows up to 80 centimetres high.

Its stem is straight and branches and is covered with hair. Leaves are ovate and entire and opposite and have short petiole. They, covered with hair, look grey.

One flower stalk bears 1-3 flowers in capitate inflorescence on its tip. The flowers come into bloom in June-October.



Rate of sprouting by months



Rate of flowering by months

Only roots are planted in the culture medium and the lower part of stem must be exposed out



Correct

It is rational to arrange a wide space between the wall of flowerpot and the plant, where new sprouts are to come forth



Wrong

If Kimilsungia is planted deep, new sprouts may be injured

Method of Transplanting Kimilsungia

PACHYPODIUM ROSULATUM

It was presented to President Kim Il Sung by Lanabossaona Philip in charge of the “Kim Il Sung Bookshop” of the Democratic People’s Republic of Madagascar on April 24, Juche 72(1983). It is a small tree or shrub belonging to the *Apocynaceae* family.

It is about 1-1.5 metres high.

The bottom of the stem is swollen like a bottle. Branches come forth from the bottom of the stem like an antler of deer. The stem and the tip of branches and their underside is covered with soft white hairs.

The flower resembles that of oleander and is yellow. It has strong viability

and grows even on rock. It is mainly propagated by seed.

Presenting the gift plant, Philip said that he earnestly hoped that Korea would be reunified independently and peacefully as early as possible.



In order to make *Kimilsungia* bloom in early September, it must be seen that temperature in the greenhouse does not fall in winter so that new shoots come out in early spring. When new shoots come out toward the end of February or in the beginning of March and vegetative and reproductive growth proceeds sufficiently in summer, it is possible to make *Kimilsungia* bloom in autumn.

What is particularly important here is that the plant should be exposed to light of

15,000-20,000 luxes for 12-14 hours a day and fertilized once or twice a week so that photosynthesis proceeds sufficiently. When temperature, illumination and nutrition are controlled properly, new stems grow 10-20 centimetres longer than the stems of the previous year and thicken 1.5 centimetres and more. When vegetative growth proceeds sufficiently in this way, the plants will bear more than ten flower buds and flowers arranged in a crescent manner will bloom beautifully and hang down.

TRACHELOSPERMUM ASIATICUM VAR. PACHESCENS

It was presented to President Kim Il Sung by Rouchio

Rousato, chairman of the International Liason Committee for the Independent Peaceful Reunification of Korea, an international organization, on April 13, Juche 71 (1982).

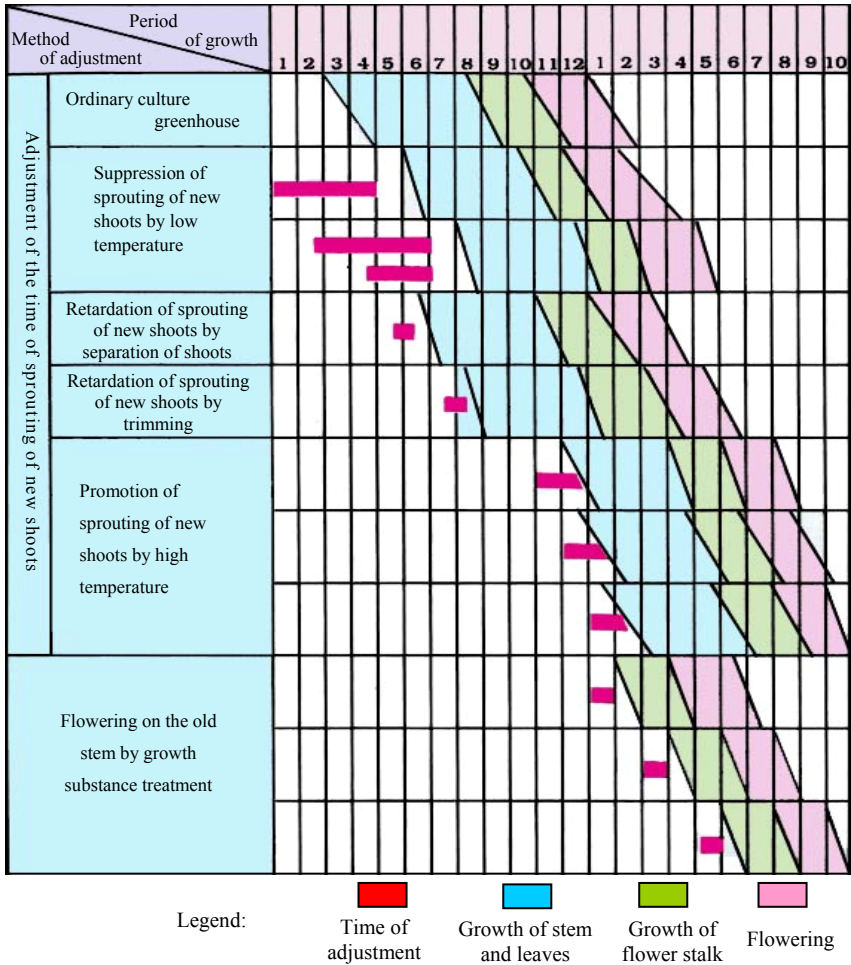
It is an evergreen creeper belonging to the *Apocynaceae* family. The stem and branches are covered with fine hairs.

Its leaves are shaped like an inverted egg and adhere to the-branch oppositely

The flower stalks come forth alternately from the bracts of the nodes. The white small flower is whorled. The flower is fragrant. It is propagated by seed and planting of cuttings.



Process of all-season flowering of Kimilsungia



KIMILSUNGIA FULL BLOWN ALL OVER THE WORLD

With emotion With veneration

Words by Jon Pyong Gu
Music by Ri Jong On

The musical score is written in treble clef with a key signature of two sharps (F# and C#) and a 4/4 time signature. It consists of five staves of music with Korean lyrics underneath. Chord symbols are placed above the notes. The lyrics are: Taeyanggonno sanulnomo molgo mon na, ra arumdapge piyona nun, chungsongui Kim ilsung hwa su ryongnim, u ro ro bulthanun gu ma um, songima da bulge bul gge o ryo isso ra.

1. Kimilsungia of loyalty is blown
beautifully
In remote countries across oceans
and mountains.
Its red flowers are pervaded
With deep reverence for the leader.

2. Loyal flower named after the
great leader
Every blossom throws us a
welcome smile.
They are full-blown in the beautiful land
Expressing the best wishes of all.



KOREAN STAMP KIMILSUNGIA



Kimilsungia

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Pang Hwan Ju (Journalist)

Photo: Kim Kwang Jin

Picture: Jo Kwang Chol

Layout: Ri Tae Hyon

Translated: Choe Ki Ju and An Jong Ho

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