



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org







**UNIDO-ČSSR
JOINT PROGRAMME
NON-METALLIC INDUSTRIES**

PILSEN

**original contains
color illustrations**

Preface

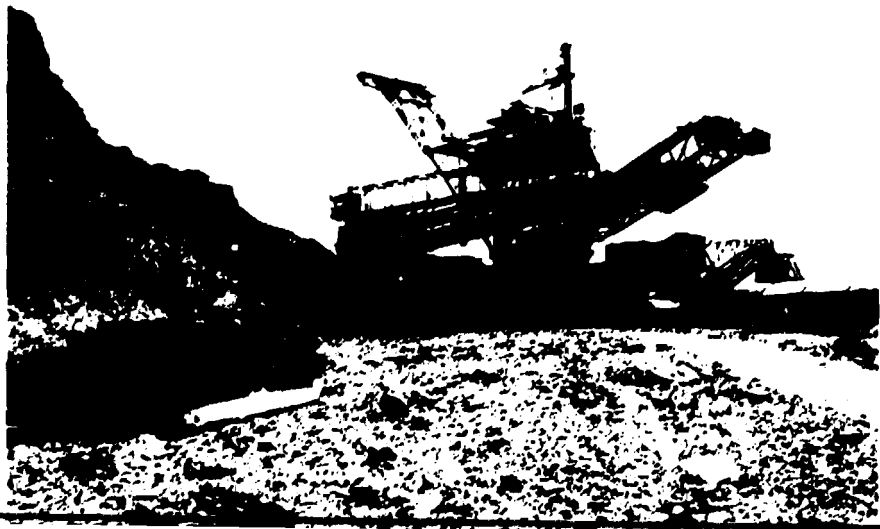
The steadily worsening natural environment almost all the world is faced with stimulates the society to seek for solutions. Prevention being most effective, the actions to rehabilitate the damaged nature contribute significantly, too. This catalogue demonstrates a potential of cheap non-metallic raw materials to support the growing of greenery which has paramountly important functions in biosphere.

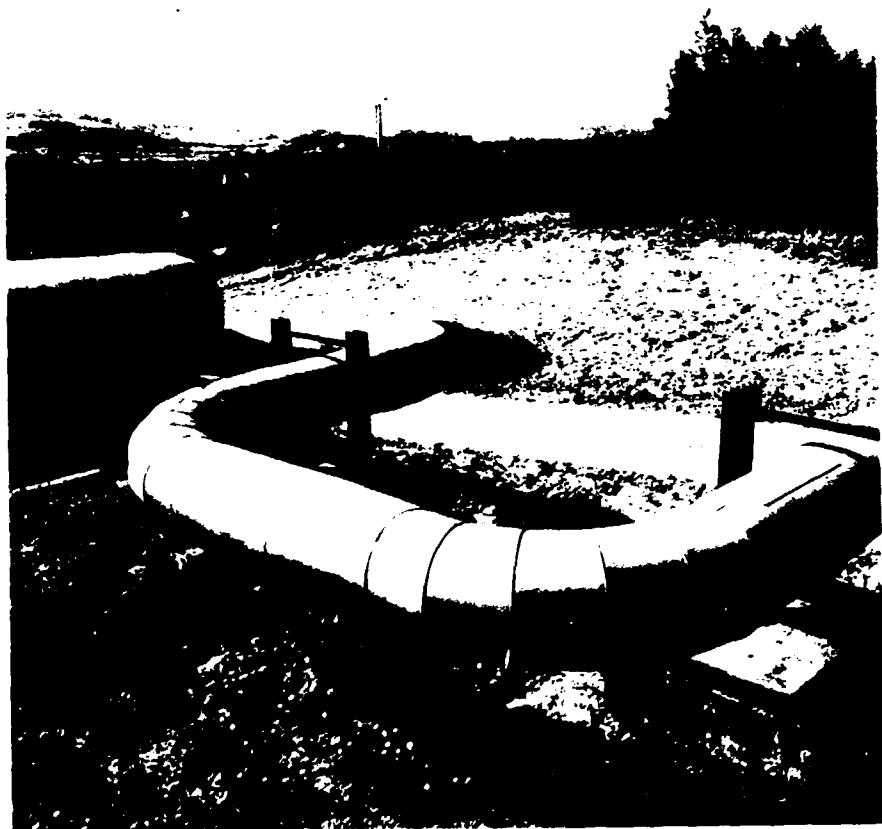
The catalogue presented, which is backed by the experience of co-editors, the State Farm Plzeň-Křimice, the Research Institute for Ceramics, Refractories and Non-metallic Raw Materials, Pilsen and the UNIDO - Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen, has its origin in the reiterating requests from developing countries for information about application of non-metallics to reclaim and rehabilitate soils and protect the environment. Informing those who look for solutions has therefore been the desire of the authors.

At present the environmental protection is a very actual problem, as the environmental pollution is one of the most urgent problems facing man. All over the world the ecology is threatened, not only in the developed, but also in the developing countries. The population growth in recent decades, the progressive depletion of natural resources, concentration of population into bigger cities and capitals, industrialization with all its secondary effects, rapid growth of traffic and other

Nature seriously hit by mining

human activities such as higher hygienic requirements, application of detergents, emballage of food, rapidly growing city and industrial garbage and others - all these are factors endangering the basis of our life and therefore also of the economy of any society. The environmental engineering has been developed as a means to apply measures for the purification of waste waters and air emissions. However, the protection of our environment became more important issue, which can not be





▲ *New greenery planted on dumped waste rock*

simplified to the environmental engineering only, as its effective implementation is the duty not only of states or entrepreneurs, but of each citizen. Environmental protection measures should not be realized only after damage has been done. Environmental impacts are to be minimized as a matter of principle. The load imposed on the environment must be kept as low as possible, because it is more difficult and expensive to modify plants and equipment afterwards than to design them compatible with full respect to the environmental protection. Those who give rise to environmental offence must bear the costs of protective measures. This awareness of

necessity and productivity of prevention from damaging the nature already in the phase of projecting has led UNIDO to adopting a policy to approve such industrial development projects only that consider and solve the environmental impact. Aside the industry, the agriculture and forestry have the basic importance for the nature and environment. The build-up of soil is a long term process. One centimeter of soil is built up, depending on climate conditions, during the period of 30 to 70 years. Therefore, the planning of towns, highways, expansion of industry must respect the availability of fertile soil which, on the top of human activities, is



landscape appearance and which contribute to the aesthetic, medical, cultural and recreation aims of each society. The importance of plants has grown up in the recent decades so far that each individual should be respected. It has been accepted that each inhabitant should, during his life, plant at least one tree, in order to contribute to the environmental improvement on his personal account. In connection it is worth mentioning that one hectare of wood eliminates yearly 70 tons of dust from the atmosphere. It is obvious that without trees no life can exist.

RUS ONTALIS GLAUCA

features:

- a prostrate, low, dense carpet-like
branches are numerous, whipcord-like
. The fresh growth superimposes on
four is a steel-blue, in the winter with

2 - 3 cm

5 - 20 cm

var doing well in permeable soils on
Bentonite substrates support colour

rockeries, ground coverer, suitable



There are many reasons why green plants and trees are indispensable for the healthy environment of people. The most important ones are related not only to the environment but also to the economy.

"PRODUCTION" OF OXYGEN

The photosynthesis is the main factor of the life, as it is the process by which the energy of sunlight is trapped by the chlorophyll of green plants and made use of to build up complex materials from carbon dioxide and water. In this way, i.e. inorganic matters are being changed into organic ones which enables green plants to grow. By growing, green plants consume carbon dioxide and release oxygen.

"MANUFACTURE" OF WOOD

Wood is very important and traditional building material, furniture material, fuel, raw material for paper making and for different other purposes. Green plants represent a renewable resource of wood, showing a large variety in quality and properties.

HYGIENIC FUNCTION

Lowering Dust in Environment

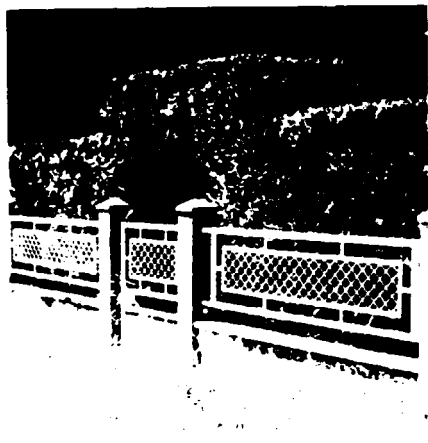
From the hygienic point of view, green plants influence hygienic conditions positively depending on the extent and structure of levels as well as on the suitable combination of green plants, i.e. tall trees, bush and surface green. Average rate of decrease of dust particles by green plants fluctuate between 60% to 70%, from the total, this rate being rarely below 50%, when only bush is available.

Decrease of Noise

Green plants are very cheap and suitable means for the decrease of noise especially in the open air. Again, the best results are achieved by the combination of trees, bush and grass. It has been proved that green forest of the depth of 20 - 30 metres lowers the noise by 10 - 12 decibels.

Phytogenesis Activity

It is known that the amount of microorganisms in the air is up to 80 times lower in parks and forests compared with atmo-



sphere in cities. This is due to the fact that some of the plants release different antimicrob, easily evaporable matters, which are called phytomes. The most important plants are jumpers, maples, pine trees, hickory and royal nut trees, pear, different types of lime-trees, poplars and other plants.

Repellent Activity

Different types of green plants and trees show their ability to release matters which ward different insects off. Such trees are nut trees, the majority of birch trees etc.

MICROCLIMATE

The green plants are able to influence the conditions of temperature, dryness, wind, light, etc. in a region, subregion or even smaller area units, in which local climatic conditions differ from each other building up microclimate. The biggest influence of plants is then recognized in *temperature conditions*, when the green plant lowers the temperature essentially. The area with green plants of the depth of 50 - 100 m can lower the temperature in shade by even more than 3,5 centigrades, *humidity of the atmosphere* is always higher by 5 - 10% in parks and forest compared with unforested areas. The average humidity gets increased up to 20% during sunset time.

JUNIPERUS CHINENSIS DOCKERY GEM

Characteristics Features

Very erect and dwarf, very compact habit. The color of the foliage is steel green.

105 ft. (6' 5" - 10' 6")

2 m. (6' 15" - 8' 6")

Remarks

Grows well in humid - permeable soils and tolerates frost. It is very tolerant even of frost.

Abundance

Native ground cover. For *Remarks*

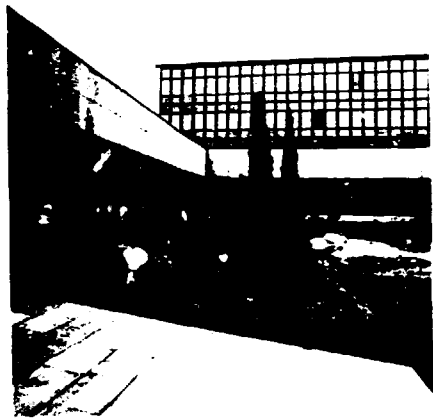


WATER AND SOIL PROTECTION

The amount of surface as well as underground water differs in regions with and without green plants. Well planted zones or strips of trees support the surface water infiltration into the soil as they reduce the erosion of soils. In areas where surface water is contaminated by soil particles, chemical fertilizers or insecticides, the purification of surface water through the soaking into the soil is very important.

SANITATION

During the human industrial, agricultural as well as other activities, the environment is jeopardized. Different types of pollutions resulting from various manufacturing processes, extraction of raw materials, mostly done by open-cast mining, change green nature into the "moon area". Population is concentrated in big cities producing bigger and bigger amount of sewage water and litters, which contain more chemical matters than any time before. Tourism is developing rapidly as a popular means of human recreation, intensification of farming demands bigger amounts of chemical fertilizers, which penetrate often into underground waters. Therefore, the environmental engineering started to develop engineering methods for environmental protection. However, the recultivation and sanitation of the nature by green plants, bushes and trees is much cheaper and more natural method, which



always will be followed together with the engineering approaches.

BIO-HOMEOSTATIC FUNCTION

The "islands" of scattered verdure represent, in the landscape affected by man, the elements of increased biotic stability comparing with ecosystems of agricultural plants. In this the dispersed greenery shares distinctly to balance landscape ecological processes.

AESTHETIC VIEW

The green plants have very important aesthetic function which can not be replaced in any other way. Tall trees in the combination with different types of bushes create an expressive element for the shaping of landscape configuration creating an attractive scenery since increase its plasticity and colour impression and as they can divide a large area into smaller, aesthetically balanced areas. The green plants are also an indispensable element of town planning as they support the incorporation of newly constructed suburbs and houses into the nature.

NIPERUS SABINA

var. torvista Fedtzev

conifer is a low shrub with slanting twigs. The
is red brown. The colour of foliage which
is had after crushing, is a steel green.

15 m. to 10 cm

10 m. to 40 cm

and

seen best in sunny positions and likes permeable

the soils

the afternoon

solitaire

JL

AI

and

The

ham

am

cap

H

S

down

of

sub

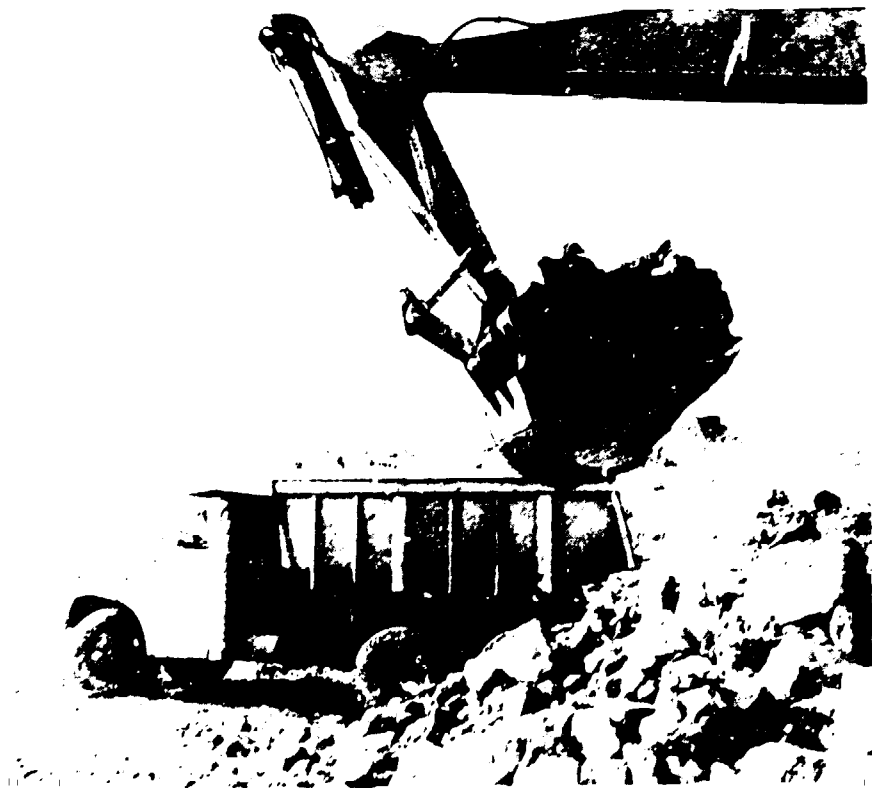
up

From the entrepreneurial point of view, the plantation of decorative cash plants and their sale is an interesting activity, as the demand steadily grows, the prices are quite interesting and this business can be started with a low capital. The price of any decorative plant depends on its growth rate. The speed of growing of decorative cash plants depends on different factors, such as temperature, light, humidity and soil composition including its fertility. The influence of the soil composition seems to be decisive, as the well balanced soil can increase the speed of their growing even more than twice. Therefore, lot of research and in plant trials was done with the composition of soils and it has been proved that non

-metallic minerals and rocks can play a decisive role in the economic aspects of green plants growing. Such non-metals are:

EXPANDED PERLITE

Expanded perlite of coarser composition is used to reclaim by making lighter the clay soils and for reclamations of so called bottoms. In this case humus is to be added turf, bark, etc. The perlite makes the heavy soils lighter with better airing and structure. Frequently other components are mixed together with perlite sand, diatomite and expanded clay.



JUNIPERUS SABINA HICKSII

characteristic features:

Cultivar characteristic of erected branches that prostrate when young; the colour of foliage is a distinct grey-blue.

H 130 cm, G 10-15 cm

S 150 cm, G 15 cm

remarks:

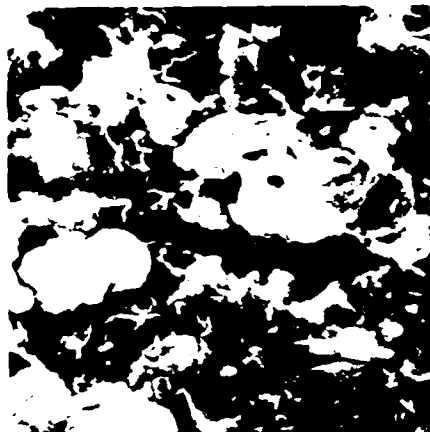
It likes sunny sittings and does well on permeable soils.

application

For rock gardens and smaller grouping, it effects well as foreground of higher greenery.

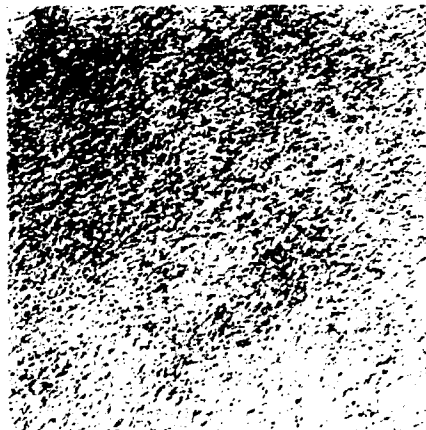
BENTONITE

Bentonite is a suitable conditioner of arenaceous and other permeable materials contained in the soil substrate. It is enough to mix finely ground or granulated bentonite with the earth to be reclaimed. Organic matters such as compost, turf or ground bark are used together with bentonite to mix a substrate containing about 25 volume per cent of organic matter which can be successfully used to cultivate ornamental plants.



EXPANDED CLAY

Expanded clay is an excellent component of light substrates which are used for mobile verdures, terraces, roof gardens. Expanded clay warms up all plantation substrates, the plants stand it very well. Frequently expanded perlite and or bentonite which adsorb nutrients and pesticides, are added to expanded clay in addition to humus. Expanded clay is an excellent substance for the hydroponics. Other suitable application concerns ground covering anywhere the soil is to be covered from aesthetic reasons.



DIATOMACEOUS EARTH

Diatomaceous earth is used in draining systems of flowerpots and for heavy clay soils. A frequent use is also to cover other plantation substrates.

JUNIPERUS SQUAMATA BLUE STAR

characteristic features:

The cultivar has a dwarf habit and a semispherical form, the foliage has grey-green colour.

H: 1 m, G: 5 cm

S: 2 m, G: 10 cm

demands:

It requires sunny, protected positions and fertile permeable soil.

application:

It effects as solitaire, in rockeries and graves.

JUNIPERUS SQUAMATA MEYERI

characteristic features:

The conifer builds up around the main trunk, that has short rapid growing branches sticking to the trunk. The foliage is made up of needles 7-10 mm long, which are dense. The juvenile foliage is of blue-white colour, the adult turns brown and drops.

The cones are egg-like, black, about 6 mm long.

H: 3 m, G: 15-20 cm

S: 2-3 m, G: 15-20 cm

demands:

It does well in permeable soils, tolerant of other conditions. It is recommended to cut off the adult dried up branches.

application: As solitaire, nice in rockeries, and

JUNIPERUS SQUAMATA PROSTRATA

characteristic features:

The conifer has a dwarf habit and forms prostrate shrubs, the colour is a grey-green.

H: 0.5 m, G: 5 cm

S: 2 m, G: 10 cm

demands:

It does well in sunny and warm positions, permeable sufficiently watered soils are required, addition of bentonite supports colouring.

application:

As solitaire, for rockeries and graves.

The large variety of growing plants requires appropriate substrates which vary according to the genesis cultivated being other for conifers, heather plants, flowers and so respectively. The synthetic substrates simulate the natural soils on which the predecessors of domesticated plants did best and therefore they are the first prerequisite of the plantation success. The choice of components is a matter of physical parameters first of all but last but not least a matter of economical availability. The horticultural enterprises use frequently also chemical matters and/or other natural improvers that can substitute for turf e.g. However, the trend is not to add harmful or even toxic matters and therefore natural non-metallic improvers that are available in most of countries are applied widely and successfully. Various foamed materials that have low specific density, considerable porosity, water absorption and resistance against chemicals can substitute to a certain extent for turf. Expanded perlite, foamed urea-formaldehyde polymer (so called hygromull) and foamed polystyrene are proved physical improvers.

Perlite

The expanded perlite is very porous material. 90 per cent of volume is taken up by open pores of various dimensions. The very low bulk density of 50–250 kg.m⁻³ and the high water ability of as far as 400 weight per cent with space left for much air are properties very resembling the turf. These properties are bearer of perlite capacity to ameliorate both light drying out soils and heavy compact substrates.

- a) in case of excessively permeable substrates perlite improves significantly the water capacity decreasing thus the propensity to dry out. By adding of 25 volume per cent of perlite the water capacity of sandy substrate can enhance as high as by 50 per cent.
- b) Adding perlite to compacter substrates their bulk density is reduced and the

porosity enhanced which affects positively the permeability. Enhancing the porosity of substrate means that water movement is facilitated so that water is available to the plants.

- c) Perlite is successfully supplied for the propagation of substrates when it is used as a sole agent or mixed with turf and/or turf with polystyrene, if need be. It is important that lower quality turf can be applied if mixed with perlite.

The expanded perlite is the closest substitute for the turf from the point of view of both the physical properties and effects considering the tested foamed matters. It applies fully for the expanded perlite of grain size of 0.5–3.0 mm.

Urea-formaldehyde polymer foam (Hygromull) is distinguished for very low bulk density 10–15 kg/m³. It is comparatively stable in the soil, only about 10 per cent of nitrogen is being liberated annually. The fact of positive effects is on a very high water holding capacity and a low hygroscopicity. The practical expression of both the above properties is the capacity to provide the plants with sufficient quantity of physiologically usable water. The tests have proved that Hygromull is as capable as the turf of affecting the water holding capacity of substrates.

Foamed polystyrene One cubic meter of polystyrene weighs about 30 kg while its flaky form weighs 1.5–20 kg. The particles contain a large quantity of fine locked pores filled in by the air. The air shares as far as 98 volume per cent. Polystyrene does bind water neither in the pores nor on the surface which distinguishes it essentially from the above materials. The main advantages of polystyrene are its elasticity, pressure strength and resistance to mechanical stress. It ameliorates the soil by its loosening and airing and it improves the thermal regime of substrate.

Examples of Applications for Soil Substrates Perlite can be successfully used in the automated water spray propagation plants. The tests carried out in the Institute

for Research and Improvement of Ornamental Horticulture at Průhonice, Czechoslovakia have shown the average values as follows: 90% pores, 3.3% capillary water, 57% air. *Rhododendron obtusum*, *Magnolia soulangeana* and *Camelia japonica* rooted up well in bare perlite but multicomponent mixtures did better.

PERLITE	HYGRO-MULL	TURF	POLY-STYRENE
1		1	2
1		2	2
1		1	2
	1	1	1 2

(in parts)

The following are substrates used for different purposes in the State Farm Plzeň-Křimice:

Substrates for Plant Propagation

- a) mixture of sand and expanded perlite in ratio 1:1 for some flower pot cultivars, citrus, *Enonymus* etc.
- b) Mixture of turf, sand and perlite in various ratio for rooting up magnolia, conifers and some heather cultivars.

Substrates for heather plants The basic

component is turf or a mixture of turf, bark and about 5% of bentonite. Also expanded perlite is added to reach about 10 per cent share. Bentonite functions well to bind manuring elements and herbicides.

Substrates for conifers 90 per cent of ornamental plants grown is seeded by a seeding machine into plastic bags. The substrate must be light and therefore it is mixed from turf, bark and about 25% of bentonite according to the want of particular cultivariants.

Substrates for orchids *Cymbidium* is grown in plastic boxes of 90 l content. This species wants airy, light substrate and the handling of boxes demands for light substrates per se, too. Expanded clay is used to cope with.

Substrates for other cultivars are blended according to the want of particular cultivariants, perlite and bentonite are used frequently. The annual consumption of substrates represents about 70 rail carriers. For mixing a pay-loader, crusher, sieving devices and fertilizer distributor are used. The particular components are fed into a manure distributor and after double mixing they are deposited onto heap. The mixed substrate is then crushed and sieved.

CULTIVATED AND OFFERED FOR SALE BY THE STATE FARM PLZEŇ - KŘIMICE

Among cultivars species of various habits and shapes can be found. Trees and shrubs of dwarf habit alter with very high trees of characteristic growth, either conical, columnal or pendular with overhanging branches, the features that govern the suitability of a species for one's garden. The ultimate height and spread and the speed of growth are also parameters that affect the gardener's choice. In the following assortment offered by the State Farm Plzeň-Křimice the used capitals understand:

H: ultimate height

S: ultimate spread

G: average velocity of vertical and horizontal growth per annum respectively to H: or S:

Coniferous trees and shrubs are woody plants that keep mostly evergreen although some drop their leaves in autumn. They grow mainly in the northern climatic zone from warmer lowlands to mountainous regions. They look cool and sad in summer while their winter effect when foliage is shed off is warm. The tree species are stately and majestic for whole the year keeping the characteristic colour and shape. Some change their colour as seasons alter to widen the variety of colour, shape and form available that provide

a valuable and fascinating addition to any garden. Conifers propagated in containers can be planted out for whole the year on condition of the soil not being frozen but to take the most of them, autumn and spring periods are recommended for planting out into properly prepared soil. Sandy soils can be improved by adding bentonite while heavier, humid soils will improve when perlite and sand are added. At any weather the new plants will need watering every evening.

ABIES



ABIES CONCOLOR

characteristic features:

Cultivar has light grey bark, the trunk has branches from the base. The cones are as long as 6 cm, silvery blue-green and twisted upwards sickle-like.

H: 25-30 m, G: 50 cm

S: 3-4 m, G: 15 cm

demands:

Cultivar requires full sun siting and fertile permeable soil. It withstands frost and urban environment easily.

application:

It effects most as solitaire.



CHAMAECYPARIS

This is one of the most widely grown and planted genus in Europe although none of the available species are native in that part of the world. They come from North America and East Asia and have produced a very wide range of cultivars of varying colour and height from dwarfs to high trees. Most of the genus grow successfully where there is adequate moisture and good drainage. They dislike exposed positions, drying winds and dry soils.

CHAMAECYPARIS LAWSONIANA

characteristic features:

Large tree of conical shape with pointed top. The branches are short, standing apart. The trunk has red-brown bark that peels off in scales when growing old. The cones are spherical, tiny and blue-green when young while those old are brown.

H: 20 m, G: 30 cm

S: 2-3 m, G: 10 cm

demands:

It grows well in shadowed and humid places disliking grass growing around its base.

application:

Cultivar does make a very useful screen or hedge. The specimen becomes a very large tree and, therefore, it is rarely planted as a solitaire.

US CEMBRA

terrestris *featuring*

terrestris is characteristic of wide egg shaped and
one at top which is fairly broad The back
with green when young and deeply wrinkled
older needles are about 5 M. in long.
and rigid. of dense spines in groups of

15 m. (c. 20 m)

1 m. (c. 5 m)

ids

able souls when brought out to the too light and
kation reaction preferred

ation

S MUGO MUGHUS

syn. Felurus

with erected trunks, branches are bent.
The bark exhibits grey brown colour.
The dark green, often twisted or turned
long cones are egg-shaped, up to 6 cm
brown. Buds are of brown colour

m, G. 5 15 cm

m, G. 15 20 cm

observed, from rough, the best results are
when plants on the sun

on groups, suitable for foregrounds

CHAMAECYPARIS OBTUSA NANA GRACILIS

characteristic features:

Cultivar of dwarf habit with branches arranged in corner manner. The colour is glossy dark green.

H: 2 m, G: 3-5 cm

S: 1-5 m, G: 3 cm

demands:

It requires fertile and humid siting.

application:

For smaller rock gardens, graves and mobile greenery.

CHAMAECYPARIS PISIFERA SAVOROSA BOULEVARD

characteristic features:

The shape of cultivar is conical, foliage distinctly silverish-bluish, turning grey-blue in winter.

H: 2 m, G: 15 cm

S: 1 m, G: 10 cm

demands:

The cultivar dislikes scorching heat, overdried soil and exposition to winds. It does well on permeable bentonite substrates and protected sitings.

application:

For larger rock gardens and as solitaire.

CHAMAECYPARIS PISIFERA PLUMOSA NANA

characteristic features:

This is evergreen conifer of wide conical shape with overhanging branches. The compact branching gets brownish yellow tint in winter.

H: 2 m, G: 5 cm

S: 3 m, G: 15 cm

demands:

Cultivar tolerant of severe frost and indigent soils.

application:

For larger rock gardens, sloping banks, effective for groupings.

CHAMAECYPARIS PISIFERA FILIFERA AUREA

characteristic features:

Cultivar has a wide conical shape, its branches are standing apart as far as overhanging, the foliage is yellowish.

H: 2.5 m, G: 5-10 cm

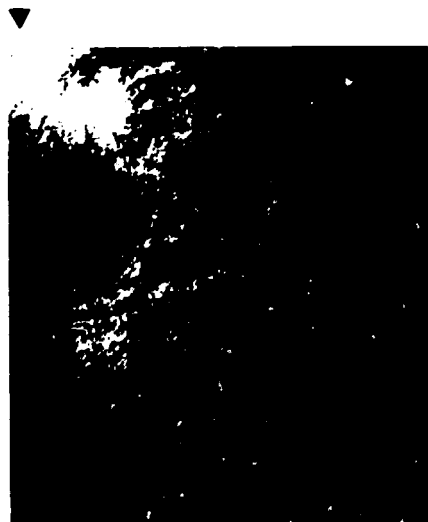
S: 4 m, G: 10 cm

demands:

Cultivar is resistant to frost and tolerant of urban environment. It does well on permeable bentonited substrates.

application:

It effects as solitaire or in larger rock gardens.



KINGO

It does not in any way resemble
the picture of a conifer but in
fact is one of the oldest of all. It is
a deciduous tree, having fan
leaves of fresh green, turning
a beautiful yellow in the autumn
falling. The only species represent-
ed in this genus is *Ginkgo Biloba* which is
very hardy and of easy culti-
vation. Commonly referred to as "Mai-
tree".

GINKGO BILOBA ▲

Characteristic features:

Cultivar of widespread conical shape, foliage is pale
green, in autumn yellowish, the base is grey colour
red.

H 40 m, G 20 cm

S 7 10 m, G 10 cm

demands

It likes full sun as far as half shadow.

application

As valuable and impressive solitaire

tions well. They will stand drought well but will do better in sunny positions than in dry shade. The plants of the genus have thin bark with scale- or fiber-look. It has compact, herry-like cones.

JUNIPERUS COMMUNIS DEPRESSA AUREA

characteristic features

The conifer is of dwarf habit with widespread branches, spring foliage yellow-green, turning bronze-gold in the winter time.

H. 0.6 m, G. 5 cm

S. 1.5 m, G. 10 cm

demands

Cultivar is tolerant, doing better in lighter soils, perlite or turf addition is productive, it likes sunny sitings.

application

JUNIPERUS COMMUNIS

HIBERNICA

characteristic features

The species is one of the most known cultivars. Its shape is columnal, branches are dense with erected tops. The foliage is blue green, consisting of 2 mm long and 1 mm wide needles.

H 1 - 4 m. G: 15 cm

S 10 x 11 m. G: 5 cm

demands

It likes permeable soil and sunny siting. Tolerant of frost and hardy.

application

For larger rock gardens, small groupings, as well as soil.

JUNIPERUS COMMUNIS HORNIBROCKII

characteristic features:

Slow growing dwarf cultivar, foliage light green, dense

H: 50 cm, G: 3-5 cm

S: 2 m, G: 15 cm

demands:

It likes sunny sitings and permeable soil.

application:

For rock gardens, graves and small groupings.

JUNIPERUS COMMUNIS REPANDA

characteristic features:

This dwarf conifer has the prostrate habit and spherical form. The branches stand apart and grow very slowly. The needle like foliage is soft, twisted inwards and arranged radially. The leaves are as far as 8 mm long, dense, evergreen with silverish stripes

H: 30 cm, G: 2 cm

S: 150 cm, G: 15 cm

demands:

It does well on permeable soil and sunny siting, tolerant of scorching heat

application:

For rock gardens, for graves, ground

UNIPERUS HORIZONTALIS PROSTRATA

Characteristic features:

habit of prostrate habit, the main branches are
erect, branches densely accumulated. The
of foliage is a steel-green, turning brownish
the winter.

20-30 cm, G: 5 cm

4 m, G: 15 cm

lands:

does well on permeable, fertile soils in sunny
situations.

Application

ground cover suitable as lawn substitute, as have
higher greenery and for graves.

JUNIPERUS CHINENSIS HETZII

characteristic features.

The shrub with erected branches, scale-like foliage of blue-green colour.

H: 2-3 m, G: 20 cm

S: 10 m, G: 50 cm

demands:

It does well in sunny positions and in light substrates.

application:

As solitary and for larger groupings.

JUNIPERUS CHINENSIS JUNGWIRTH

characteristic features.

Evergreen conifer with erected branches, foliage of dark green with bluish tint.

H: 2-2.5 m, G: 15 cm

S: 3 m, G: 15 cm

demands:

It does well in permeable soils on sunny positions, the heavy soils are to be mixed with perlite or crushed bark.

application:

As solitary, valuable cover of sloping banks, it effects in grouping nicely.



JUNIPERUS CHINENSIS MORDIGAN AUREA

characteristic features.

The conifer is of wide compact growth with scale-like foliage of yellow tops which turn bronze-golden in the winter time.

H: 20 m, G: 15 cm

S: 19 m, G: 15 cm

demands:

It does well in sunny positions and light permeable substrates.

application:

For larger rock gardens, for groupings and mobile greenery.

JUNIPERUS CHINENSIS OLD GOLD

characteristic features.

Evergreen conifer of stout habit with brass-golden foliage.

H: 2.5 m, G: 10 cm

S: 2.5-3.0 m, G: 30 cm

demands:

Very hardened cultivar, it likes sun or mild shadow and does well in permeable fertile soils.

application:

It effects as solitary, in larger rockeries and groupings used also for mobile greenery.

JUNIPERUS CHINENSIS PFITZERIANA

characteristic features.

The cultivar has habit of wide shrub with branches standing bow-like apart; the scale-like foliage which is pointed towards the trunk is of light green colour.

H: 3 m, G: 20 cm

S: 10 m, G: 50 cm

demands:

Tolerant cultivar, it likes sun and does well in perlite-lightened substrates.

application:

As solitary, for wide hedges and groupings.

JUNIPERUS CHINENSIS ► PFITZERIANA AUREA ►

characteristic features.

The cultivar has habit of wide shrub, its branches stand bowing apart. The scale-like foliage turns into pointed needles inwards the centre. The juvenile shoots are yellow, adult turns yellow-green. It has only male blossoms which are yellow.

H: 2-2.5 m, G: 20 cm

S: 8-10 m, G: 40 cm

demands:

It does well on permeable soils, bentonite in substrate supports colouring, it likes sun and resists frost.

application:

It effects most as solitary contrasting nicely with dark backgrounds. It can grow above 3 m if the juvenile shoots are tight.

JUNIPERUS CHINENSIS PFITZERIANA COMPACTA

characteristic features.

Dwarfish and compact in habit, the colour of foliage is a light green.

H: 50 cm, G: 5 cm

S: 2 m, G: 20 cm

demands:

Tolerant cultivar that likes sunny positions and permeable soil, sandy soils can be improved by bentonite.

application:

As solitary, for rock gardens, as ground cover.

ISSA OCCIDENTALIS MSTRUPII

Characteristic Features

very dense and regularly spherical, conifer
terminals grow fast, nevertheless the tree is of
growth. foliage is evergreen, leaves are of
the shape being brightly green

1 m. G. 15 20 cm

10 m m. G. 5 10 cm

able soils, standings on sun to half shadow.

ough

tion

UJA OCCIDENTALIS LONYANA

Characteristic features

Form of close shape, slightly rounded. Twigs are flat, light green. It tolerates cutting well.

1.5 m, G. 30 cm

2 m, G. 5-10 cm

Uses

Valuable cultivar which does not freeze in Mid-European conditions. It is recommended to wet soil and tree after planting out. Tolerating of environment well.

Plantation

Use, hedges in groups.



JUNIPERUS SABINA GLAUCA

characteristic features

The conifer has dense irregular almost creeping branches, the colour of foliage is a grey blue

H 1 - 1,5 m, G 10 cm

S 3 - 3,5 m, G 15 - 20 cm

demand:

Substrates added with bentonite support blue colouring, it likes sunny positions

application

In groupings and for higher foreground - imple, vive also as solitaire and in mobile greenery

JUNIPERUS SABINA ARCADIA

characteristic features:

The conifer has a dwarf habit, the branches overhang building up arcades of impressive appearance. Large carpets of the species resemble water rapids.

H 1 m, G 5 cm

S 3-3.5 m, G 10-15 cm

demands:

Cultivar tolerant of exposition to light, permeable substrates suitable, bentonite adds to its build-up.

application:

For rockeries and mobile greenery and as coverer of terraces and graves.

JUNIPERUS SABINA CUPRESSIFOLIA

characteristic features:

A favourite cultivar of covering habit and wide-branched form with blue-green foliage.

H 0.5-0.8 m, G 5 cm

S 3-3.5 m, G 15-20 cm

demands:

It does well in sunny or light positions, it likes permeable soils.

application:

As solitaire, for rockeries and graves, it also effects perfectly as foreground of higher greenery.

JUNIPERUS SABINA DOUGLASII

characteristic features:

Evergreen wide branched conifer, the branches stand erect and later overhang. The small twigs are straight and grow rapidly, the needle-like foliage is bluish on top and green on bottom, turning purple in the winter time.

H 1.5 m, G 10 cm

S 8-10 m, G 40 cm

demands:

Tolerant cultivar liking exposition to sun and permeable soils.

application:

As solitaire and coverer effective in sloping banks

JUNIPERUS CHINENSIS VARIEGATA

characteristic features:

Conical in shape, the conifer has erected twigs with scale-like foliage of bluish tint, the twigs are fancy whitish.

H 4 m, G 15 cm

S 1.5 m, G 3-5 cm

demands:

It does well in sunny position but tolerant of mild shadows. It prefers permeable soils, bentonite supports colouring.

application:

As solitaire and for larger rockeries and compact groupings.

▲
**JUNIPERUS SABINA
VARIEGATA**

characteristic features

A low shrub, with slanting branches and scale like as far as needle like foliage, the green twigs have yellow white stains.

H: 1.3 m, G: 5 cm

S: 2 m, G: 5-10 cm

demands

It likes permeable fertile soils and does well in sunny sitings.

application

Effective as solitaire, in rockeries and groupings.

◀
◀
**JUNIPERUS SABINA
TAMARISCIFOLIA**

characteristic features

Dwarfish in habit, the conifer has widespread branches that are layered horizontally, the foliage is of blue green colour.

H: 0.5 m, G: 5 cm

S: 2 m, G: 15 cm

demands

It does well in sunny positions and permeable fertile soil, bentonite supports colouring.

application

As a solitaire, for rockeries, ground covering and graves.

... it is needle-like while exposed is scale-like.
3 m. G: 15 cm
10 m. G: 30 cm

Notes:

... sunny sitings but tolerant of mild shade.
... requires permeable soils.

Reaction:

... in high ground coverings and for
... of high greenery, suitable for cover
... constructions such as garbage can sitings

PERUS VIRGINIANA PARTITA

Prinos. Tenuiflor.

near forms a low evergreen shrub with
arranged stretching branches; needle like
of blue green colour.

G: 5 cm

G: 15 cm

well in permeable humus rich soil. Tolerant
me, bentonite adds to its colour

on

rock gardens, impressive in sloping banks,
for making up high greenery

MICROBIOTA

MICROBIOTA DECUSSATA

characteristic features:

originates from Siberia. The conifer is very sturdy having completely prostrate habit. Leaves resemble thuja. Scale-like leaves are of green colour with bronze colouring in winter time.

H: 0.6 m, G: 3-5 cm

H: 2 m, G: 5-10 cm

demands:

tolerant conifer, bentonite supports hibernation.

application:

rock gardens, mobile verdure, graves, ground covering.

PICEA

The picea-genus are evergreen trees, shrubs and dwarf shrubs. Roots are shallowly placed. The plant is sensitive to uprooting. Demands for soil quality are lower than for fir planting. They are growing better under pure and humid air and in the wetter soil. Cones are overhanging, non-breaking. Picea trees are widely applied.

PICEA GLAUCA CONICA

characteristic features:

has a strictly regular conical shape with small, compact twigs. Needles are light green.

H: 3 m, G: 15 cm

H: 1.2 m, G: 5 cm

demands:

tolerant cultivar, being well influenced by dewing

in hot weather, it likes sunny protected sitings.

application:

solitaire, graves, rock gardens.



PICEA ABIES NIDIFORMIS

characteristic features:

Flatly spherical dwarf shrub growing in plate-like shapes.

H: 1 m, G: 3-4 cm

S: 2 m, G: 15-20 cm

demands:

Tolerant cultivar, it does well in humid sitings.

application:

Solitaire, rock gardens, graves.



PICEA ABIES INVERSA

characteristic features:

Spruce of upright, columnal growth. Branches are adjoining the trunk and bowing down to the ground. Needles are thick and shiny green.

H: 10 m, G: 25 cm

S: 2.5 m, G: 15 cm

demands:

Soil requirements are less demanding than for fir, it roots shallowly and can suffer from uprooting. Use of bentonite is recommended for light soil conditioning.

application:

Solitaire, free groups.

PICCA

PICEA PUNGENS GLAUCA

Characteristic features:

by conical up to columnar
ches and 8-18 mm long
reen with two white stri-
ones are 3-6 cm long.
on cinnamon brown co-
eady.

Evergreen tree with broadly conical top. Branches
are almost horizontal in plate-like whorls. Needles
are rigid, pungently pointed, radially positioned,
up to 30 mm long. Cones are oblong, of cylindrical
shape, light brown, up to 10 cm.

H: 20 m, G: 15 cm

S: 5-7 m, G: 10 cm

demands:

wetter soils; it tolerates
er areas, easily making up

It likes permeable soil or better high subsoil water
and sunny places. Shadow is tolerated badly.

application:

Solitaire and also in groups.



PICEA PUNGENS GLAUCA GLOBOSA

characteristic features:

Dwarf conifer that grows irregularly and freely when juvenile. Later its habit turns into spherical and compact shape. Whitish-blue needles of a sickle shape are 10 mm long.

H: 2 m, G: 10 cm

S: 2.5 m, G: 15 cm

demands:

Permeable soils, free and sunny siting.

application:

Solitaire, rock garden, mobile greenery



PICEA PUNGENS GLAUCA KOSTER

characteristic features:

Regularly conical tree with silver-blue pine needles.

H: 10-15 m, G: 30 cm

S: 3-4 m, G: 15-20 cm

demands:

Appropriate wet siting, addition of bentonite will fix the rooting system better.

application:

Solitaire, high hedges.



PINUS

Evergreen trees and shrubs with pictures-que tops. Needles are of different length and colour as well as cones which are of variable size with plenty of shapes and fall down completely. Pine trees are mo-dest plants tolerating poor or even stony and dry soils.

PINUS ARISTATA

characteristic features:

The bark of young trees is smooth and green, later grey and flaky. Branches are knitted through, needles are found in groups of five, of dark green colour, whitish dotted.

H: 2-3 m, G: 10-15 cm

S: 1.5-2 m, G: 10 cm

demands:

Tolerating well of poor and even stony soils.

application:

Solitaire, arranged mobile greenery.



PINUS SILVESTRIS

characteristic features

Pine tree typical for mild climate zone, needles

4-7 cm long, hard

H 10-30 m, G 50 cm

S 5-6 m, G 20 cm

demands

Tolerant coldest, frost tough

application

Suitable, in groups, forest planting

PINUS NIGRA AUSTRIACA

characteristic features

Tree of straight trunk with grey to brown-grey bark which is deeply wrinkled when old. Needles are dark green, hard, 8–12 cm long, cones are attached, up to 8 cm long.

H: 20 m, G: 70 cm

S: up to 10 m, G: 35 cm

demands

Plant tolerant of frost, prospering well in sufficiently permeable soils.

application

Solitaire, in groups.



PINUS PONDEROSA

characteristic features

The bark of old trees is up to 10 cm thick, brownish black, scaling-off tabularly. Needles are up to 25 cm long, in groups of three, dark green, pointed. Cones are egg-shaped up to 15 cm long, of glossy light green colour.

H: 50 m, G: 70 cm

S: 15 m, G: 40 cm

demands

Relatively tolerant cultivar which stands well deficient soils.

application

Solitaire and in groups.



PINUS STROBUS

characteristic features

Tree of high growth with widely conical top which is wide when old, with horizontally growing branches. The needles are blue-green, 5–10 cm long, soft, straight and thin in groups of five. Cones are brown, up to 20 cm long, closely cylindrical. The tree builds up a straight trunk which has plain, glossy grey-green bark till old age.

H: 20–30 m, G: 50 cm

S: 10–15 m, G: 25 cm

demands

Sandy to sandy-clay permeable soils, sunny to semi-shallow stands.

application

Solitaire, groups, suitable for planting on larger area.



THUJOPSIS

THUJOPSIS DOLOBRATA VARIEGATA

characteristic features:

Shrubby tree with thin trunk, whorl-like branches with flatly positioned twigs. Scale-like leaves are dark green with expressive white drawing on the back-side.

H: 15 m, G: 30 cm

S: 5 m, G: 15 cm

demands:

It likes humid siting, does not bear scorching heat. It is recommended to add bentonite into light soils.

application:

Solitaire, or in smaller groups.

TAXUS

Evergreen dioecious needle shrubs which are poisonous except for fruit pulp. The bark is of red-brown colour, needles dark green, flat. The tree grows slowly, preferably in half-shadow sitings with sufficient moisture. Taxus is tolerating of industrial environment.

TAXUS CUSPIDATA

characteristic features:

The bark is of red-brown colour, young shoots are reddish, needles pointed 15-25 mm long dark green. The species represents a highly cold-tough conifer.

H: 10 m, G: 30 cm

S: 8 m, G: 20 cm

demands:

Wet, permeable, fertile and shielded standing.

application:

Solitaire, in groups.

TAXUS BACCATA FASTIGATA

characteristic features:

The tree groups in wide column, its branches are dense, perpendicularly stretching. Needles are radially positioned, 2-3 cm long, black green colour.

H: 8 m, G: 15 cm

S: 1.5-2 m, G: 5 cm

demands:

There is a need of shielding for young plants which must not be let to overdry. In the summertime frequent dewing is recommended. The tree requires wet fertile soils.

application:

Rock gardens, graves, as solitaire

TAXUS BACCATA FASTIGATA AUREA

characteristic features:

The tree of widely columnal shape, branches are dense, perpendicularly stretching. Needles are radially positioned, 2-3 cm long, of fancy gold-yellow colour.

H: 8 m, G: 15 cm

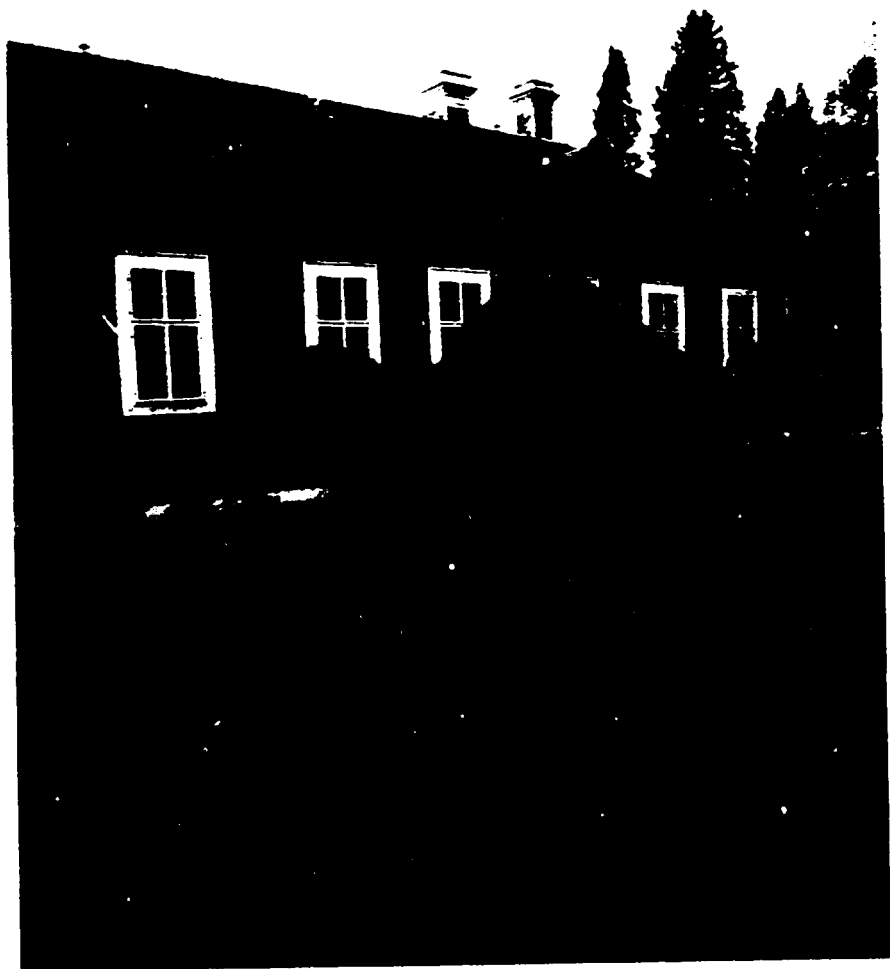
S: 1.5-2 m, G: 5 cm

demands:

It requires shadow when young. The plant does not stand overdrying. In the summertime frequent dewing is recommended. The tree requires wet fertile soils.

application:

Rock gardens, graves, as solitaire



TAXUS BACCATA DOVASTONII ▲

characteristic features

It has shrubby to tree like shape, horizontal and long branches. The bark has red brown colour, wood is reddish, needles dark green and flat. It grows slowly.

H: 2-8 m, G: 5 cm

S: 8-10 m, G: 25-30 cm

demands

Adequate wet and fertile, permeable soils agree with Taxus. It likes half shadow sitings and tolerates cutting well.

application

Solitaire, small groups of low growth, lower hedge.

THUJA

Coniferous trees, small trees, shrubs, or dwarf species with very dense, translucent top as a rule. Leaves are scale-like, seldom needle-shaped, positioned ahead; twigs are flat, cones are tiny, of oblong to egg-like shape. Tolerant frost-tough and adaptable conifer. It tolerates drought badly and has good shaping features. It tolerates industrial environment sufficiently.

THUJA OCCIDENTALIS ERICOIDES

characteristic features.

Multi-top bush with matt grey-green fine leaves.

H: 3 m, G: 1.5 - 2.0 m

S: 2 m, G: 10 cm

demands:

The colour of leaves is brighter when planted in light soil, enriched by bentonite. The cultivar is not resistant to long dry periods. Dewing is recommended during sunburn.

application:

For rock gardens and groupings.

THUJA OCCIDENTALIS GLOBOSA

characteristic features

The tree is of spherical dwarf shape with dark green foliage.

H: 1.5 m, G: 3 - 5 cm

S: 1.5 m, G: 3 - 5 cm

demands

Dewing is necessary after planting out, though commonly tolerant, the plant requires dewing when young.

application

Solitaire, low hedges, rock gardens

THUJA OCCIDENTALIS ► CLOTH OF GOLD

characteristic features

Yellow coloured cultivar

H: 10 m, G: 20 - 30 cm

S: 1 - 5 m, G: 15 cm

demands

Tolerant cultivar, colouring better in bentonite substrates

application

Solitaire, in groups, the most of its colour is made for garden architecture

THUJA OCCIDENTALIS HOWEYI

characteristic features:

Dwarfish in habit, egg-like shape, regular, erected branches.

H: 1.5 m, G: 5 - 10 cm

S: 1.5 m, G: 5 - 10 cm

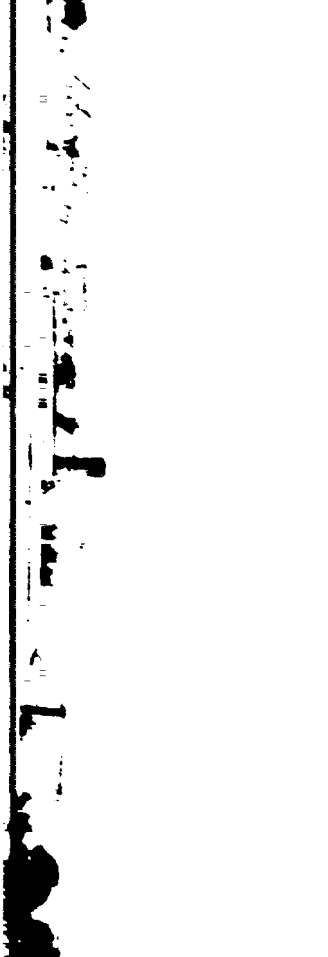
demands:

Sunny up to light standing. The cultivar is frost-tough.

application:

As a solitaire, for rock gardens and lower hedges.





A OCCIDENTALIS

NGOLD

Its features

Low growing cultivar, needle like leaves
transform to scale like type when cold
are gold yellow when budded out, later
low and of copper shade during winter

h, G. 15 cm

m, G. 10 cm

Low demanding cultivar, however very
dry standing. Better growing at a sun
shaded place. The foliage colour better
in soil enriched with bentonite

use, for rock gardens

THUJA OCCIDENTALIS SMARAGD

characteristic features:

The variety grows in a slim, conoid shape, with sparse branches and fresh, green foliage.

H: 5-7 m, G: 15-20 cm

S: 1.5-2 m, G: 5-10 cm

demands:

The plants grow best at sunny or slightly shaded standings, in wet and permeable soils.

application:

As a solitaire, for green walls.

THUJA OCCIDENTALIS SPIRALIS

characteristic features:

Cultivar of a slim, conical shape with very short branches, strikingly twisted in spirals.

H: 10-15 m, G: 30 cm

S: 1.5 m, G: 5-10 cm

demands:

Sunny, up to slightly shaded standings suits better to this cultivar. Frost-tough. It requires fertile, permeable soil.

application:

As solitaire or for smaller groups.



THUJA OCCIDENTALIS SUNKIST

characteristic features:

Upright conifer of a narrow spherical shape with a very dense, regular top, growing slowly. The leaves are scale-like of an intensive yellow colour.

H: 2-3 m, G: 15-20 cm

S: 0.8-1 m, G: 5-10 cm

demands:

Permeable soil, not very dry standing, otherwise tolerant. Sun-loving, frost-hardy variety.

application:

As a solitaire and for rock gardens.

THUJA OCCIDENTALIS TINY TIM

characteristic features:

Dwarfish evergreen conifer of spherical shape, scale-like leaves, green, dense, compact branches.

H: 0.8 m, G: 3-5 cm

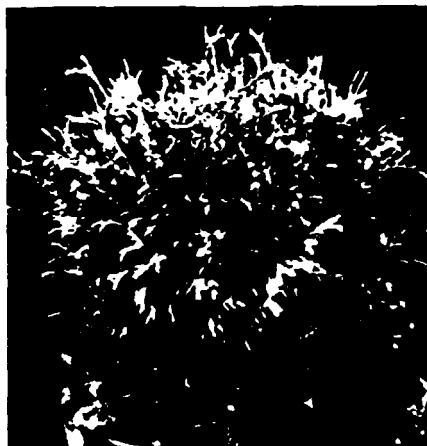
S: 1 m, G: 3-5 cm

demands:

Permeable, not too dry soils; sunny, up to slightly shaded standings. Frost-hardy variety.

application:

As a solitaire and for rock gardens.



THUJA OCCIDENTALIS WAREANA

characteristic features:

Conifer of a dense, conoid shape, main branches stretched out, small branches widely fanwise arranged, fresh green.

H: 7 m, G: 15-20 cm

S: 2-3 m, G: 10-15 cm

demands:

Sunny or slightly shaded standings, permeable soils. Tolerant of pruning.

application:

As a solitaire, for green walls and for groups.

THUJA OCCIDENTALIS WAREANA LUTESCENS

characteristic features:

Conifer of a dense, conoid shape, main branches stretched out, small branches widely fanwise arranged, light yellowish foliage.

H: 7 m, G: 15-20 cm

S: 2-3 m, G: 10-15 cm

demands:

Sunny or slightly shaded standings, permeable soils.

application:

As a solitaire, for hedges, for groups.

THUJA PLICATA

Characteristics Features:

Upright, conifer of columnar shape, bearing the nearly horizontal, stiff needles. Leaves are a dense, dark green and of a dark green. Cones have an egg-like shape, 1.2 mm long, leathery brown.

H: 12 m G: 50 cm

N: 2.4 m G: 15-20 cm

Remarks:

It does spray and in low densities, it is a symbol of low demands, frost hardy when planted in soils with benifite.

Application:

As a solitary, for high heights, for groups, tolerant of pruning.





TSUGA

inferous trees from high to dwarf plants. Needles are flat, expressively vert. with two apparent beige stripes. Leaves are small, very decorative. The tree likes sun, accepts slightly shaded findings and grows best in fertile, adeq. wely wet soils.

TSUGA CANADENSIS

characteristic features
Dwarf trunk, the top widely columnal, branches almost horizontal, grouping at the tips. The leaves are glossy green, up to 18 mm long, the needles are egg-shaped, non-disintegrating.

H 1.5 m, G 20 cm
S 1.0 m, G 15-20 cm

and

Light standings, adequately wet, permeable soils
application
For rock gardens, as a substitute for groups

TSUGA CANADENSIS JEDELOH

characteristic features
Dwarf conifer, semi-globular in shape, with funnel-like opening in the top

H 1 m, G 4-5 cm
S 1.5-2 m, G 5-10 cm

demands

Light standings, permeable, adequately wet soils
application
For rock gardens, as a substitute

RHODODENDRONS

Rhododendrons are bushes of low, some times low laying shape. Rhododendrons of high growth occur too. There are deciduous, semi-deciduous and evergreen species. They require acidic soils without calcium. They do best in semi shady standings and like humid but not too wet milieu.

RHODODENDRON CATAWBIENSE BOURSAULT

characteristic features

Evergreen cultivar with oblong, egg shaped, 7-15 cm long, dark green, glossy leaves. The flowers are about 5 cm in diameter, carmine, forming inflorescences of 15 to 20 flowers.

H: 4 m, G: 15 cm

S: 4 m, G: 15 cm

demands: Peat substrates of moderately acidic reaction, semi shaded standings suit best to this hardy cultivar. Tolerant of pruning.

application

As a solitaire, for groups, as a ground cover in combination with high, scattered trees.

RHODODENDRON CATAWBIENSE GRANDIFLORUM

characteristic features

Evergreen cultivar with oblong, egg shaped, 7-15 cm long, dark green, glossy leaves. The flowers are about 5 cm in diameter, purple with green spots, forming inflorescences of 15 to 20 flowers.

H: 4 m, G: 15 cm

S: 4 m, G: 15 cm

demand:

Peat substrates of moderately acidic reaction, semi shaded standings, suit best to this hardy cultivar. Tolerant of pruning.

application

As a solitaire, for groups, as a ground cover in combination with high, scattered trees.

RHODODENDRON ROSEUM ELEGANS

characteristic features

Later flowering cultivar, the flowers of a purple rosy colour.

H: 3 m, G: 15 cm

S: 4 m, G: 15-20 cm



cultivar starts flowering in mid May.

H: 2 m, G: 10 cm

S: 2.5 m, G: 5 - 10 cm

demands:

It requires peat substrate of acidic reaction, without calcite. It can be planted in sunny standings, frost-tough.

application:

As a solitaire, for groups, for rock gardens, in combination with higher plants.



DIFFERENT TYPES OF HYBRIDS



DENDRON GHAM WHITE

Features:

ly, white flowering cultivar.

cm

20 cm

DENDRON UM JACKSONII

Features:

species of globular growth, flowers
buds are rosy, white blooming. This

~~_____~~

- ECHU** — rose; flower with a yellow eye
- EBRAI FAR** — light up to dark carmine red
- EONDYKE** — bronze yellow
- ERSH** — white with a yellow eye
- ROYAL COMMAND** — dark carmine red
- ATAN** — scarlet
- ALZAC** — expressive flowers of red, lovely smelling
- IREBALLE** — dark red, expressive flowers
- 1.5–1.8 m, G. 15 cm
- 1.5 m, G. 15 cm

Commandy

The cultivars require permeable peat substrate without calcite, they like sunny up to semi-shadings

Application

as a solitaire, for groups, in combination with evergreen cultivars or rhododendrons

RHODODENDRON MPEEDITUM BLUE T T

Characteristic Features

Evergreen, low, dense subshrub with short, slightly
dark, shoots, elliptic leaves, about 15 mm long. It
blooms in April and May. The flowers are opened
light up to dark purple colour, slightly smelly.
The flowers are arranged in two or three flower on
up shoot.

SO CO. G. 5 cm.

600 cm. G. 100 - 150 cm.

Remarks

Very non-adapted substrate, grows up to slightly
shaded standing. Frost hard.

Origin of form

Decorative beds, foreground of higher subshrubs
or groups.

RHODODENDRON REPENS — HYBRIDS

Characteristic Features

Prostrate bushes.

RADDIN RADDIN — dark scarlet flowers.

RADJH SIN — reddish buds, dark scarlet flowers.

SCARLET WONDER — large, dark scarlet flo-

wers.

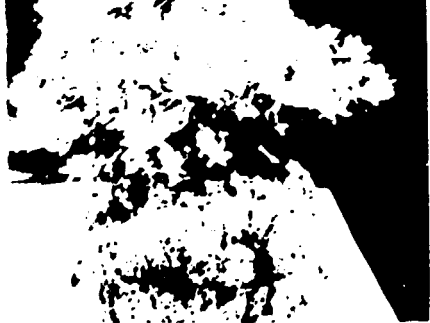
Application

In combination with higher rhododendron of
fence on grass.

flowers.

application:

In combination with higher plants, decorative beds, for graveyards, in rock gardens.



VACCINIUM CORYMBOSUM

characteristic features

Deciduous bush of upright growth, with yellow-green branches. The leaves are egg-shaped up to narrow, from 3 to 8 cm long, orange-scarlet in autumn. The flowers have a cylindrical up to oval shape, 6 to 9 mm long. The berries are spherical, 8-15 mm in diameter, blue-black. Numerous cultivars exist.

H - 1-2 m, G - 30 cm

S - 2.5 m, G - 30 cm

demands

Pervious, fertile soils of acidic reaction, without calcium

application

Decorative bush for rock gardens, as a solitary and for groups.



ERIS THUNBERGII

Key features:

Dense thorny shrub with dense branches. The rounded foliage has distinct yellow variegation that turns green-yellow in shade. It grows slowly.

Fl: 5 cm

Fr: 5 cm

Position: Full sun supports colouring.

Use: Edges and groups.

ERIS THUNBERGII ►

PHIPPIA



cences of five to six flowers, sometimes
H: 60 cm, G: 5 cm
S: 2-3 m, G: 15-20 cm

demands:

Tolerant cultivar, liking sunny sitings.

application:

Suitable ground coverer on sunny sitings, for mobile greenery, rock gardens and graves.

COTONEASTER HORIZONTALIS

characteristic features:

Semi-deciduous, sometimes deciduous bush with horizontal branches, that stretch out regularly, with dark green glossy leaves.

H: 1 m, G: 10 cm

S: 1.5 m, G: 15 cm

application:

For rock gardens, decorative vases, for ground cover and as a solitaire.

MAGNOLIA SOUSANCIANA

characteristic features:

Deciduous, prostrate bush with elliptic, up to 15 cm long leaves. Pink buds turn to white when blooming, flowering in March and April before budding.

H: 4-6 m, G: 20 cm

S: 6 m, G: 30 cm

application:

As a solitaire, for groups, mobile greenery.



MAGNOLIA STELLATA ▶

characteristic features:

Deciduous bush with white flowers. Blooming in March and April.

H: 2-3 m, G: 10 cm

S: 2 m, G: 10 cm

application:

For rock gardens, as a solitaire, mobile greenery.

The State Farm cultivates 10 090 ha of agricultural land of which 8 951 ha are arable. As for the soil types a third of arable land is situated in sugar-beet region while two thirds are represented by less fertile soils of the potato region. The vegetation production programme concentrates on cereals, forage, beet, potatoes and vegetables while the animal husbandry is specialized in the production of milk, beef and pork. The farm has 5 agricultural divisions and one service plant that provides for maintenance, transport, heavy mechanization, plant protection and drying facilities. A detached large-scale porker plant is owned by the farm which is also selfsupplying with civil engineering works, building maintenance and technical recultivations and meliorations. Cereals represented by wheat, barley, rye and oats are grown on 4 624 ha and their production accounts for average hectare yield of 4.5 tonne. The farm grows lucerne, clover, maize and grass feeding as forage and supplies Pilsen, the capital of West Bohemian region with vegetables, flowers and conifers. The farm rears 3 234 cows, which milk in average 11.15 litres daily, and 1 094 pieces of cattle

bred for meat that give a daily increment of 0.85 kg per animal. There are reared 563 sows littering 18 piglings each year and 12 474 porkers that put on flesh 0.60 kg daily per animal. The farm has also 29 horses and 60 colonies of bees and three large-scale poultry farms.

Gerbera plants growing in plastic bags with bark (peat) bentonite substrate



Vegetable production on sandy soils ameliorated by bentonite

Livestock breeding



The plant Horticulture producing cash plants takes up about 5 hectares in the locality *Plzeň-Křimice*. There are situated glasshouses, japons and foil-houses, which take up 1.2 ha; the open air turf area on which heather plants grow has surface area 0.9 ha, 2.1 ha hosts container beds, where conifers are planted in plastic bags and containers situated on consolidated areas covered with black plastic foils. The left area is interwoven with communication system, compost preparation plant, warehouses and other facilities.

The assortment of grown decorative plants is manifold.

Cut flowers represented by carnation, orchid, gerbera, daffodil, strelizia.

Pottflowers, mainly azalea, camelia, ficus, croton.

Heather plants such as azalea, rhododendron, heath bell, heather, leucocia, pieris.
Low broad leave shrubs among which berberis, various cotoneasters and potentilla are favourite.

Containers represented by a wide variety of cultivariants.

A part of greenhouses is used for the propagation of the whole assortment.





Sedigraph apparatus for a very quick high precision sedimentometry

Nuclear absorption spectrophotometer



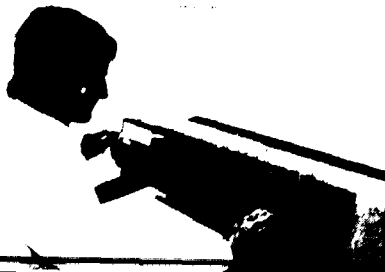
High temperature laboratory furnace



Environmental engineering laboratory



LEF
LABORATORY EQUIPMENT



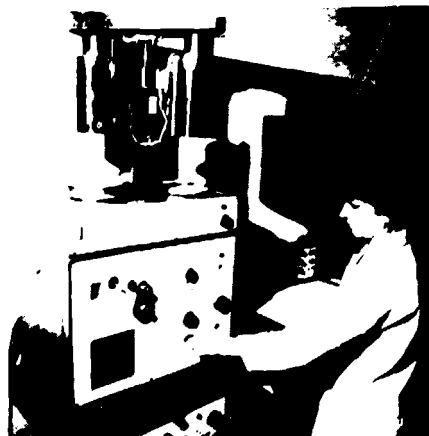
This institute is the research and scientific basis of the Czechoslovak Ceramic Works.

- deals with governmental, ministerial, branch and plant research and scientific projects including fundamental research and development in:
 - new technologies and products of refractories, structural and other ceramics, including insulating materials
 - new technologies and dressing of non-metallic raw materials and their non-traditional applications
 - progressive automation and mechanization equipment
 - automation elements and systems for regulation and management of technological processes in dressing of non-metallic raw materials
- carries out experimental laboratory tests and assists to introduce the results of scientific research and development in production
- elaborates technical and economic prognostic studies for further progress in ceramics and co-operates in the preparation of development strategies
- rationalizes energy management in ceramics
- exercises its function as the chief coordinator of inter-disciplinary scientific and technological development
- shares in standardization in ceramics
- exports non-standard products of its own make and technical services
- actively promotes international co-operation
- provides advisory engineering and technical assistance to domestic and foreign contract partners through the UNIDO-Czechoslovakia Joint Programme, Pilsen, Czechoslovak Foreign Trade Corporations, namely POLYTECHNA with its Czechoslovak

slovak National Recruitment Centre of United Nations

- undertakes testing of new ceramic products and materials
- engages in research and development of new technologies concerned with the protection of environment and non-waste technologies
- co-ordinates and realizes selected projects of UNIDO.

The Research Institute has its headquarters in Pilsen. It controls and co-ordinates, from a technical and economic point of view, all scientific and research activities of its departments and sections (Scientific and Technological Assistance Department, Energy Management Department, Industrial Economy Section) and detached Research Division at Horní Bříza, Karlovy Vary, Ráječ-Jestřebí and Borovany.



▲ Derivatograph apparatus for thermal analyses

◀ IBM personal computer is widely applied for research projects



▲
Mr. Domingo L. Stazon Jr., Director General of UNIDO, inspecting the UNIDO Czechoslovakia Joint Programme, Non metallic Industries, Pilsen

▶
Fellowship of Chinese engineers — non metallic minerals processing research



Group training of Egyptian engineers for energy management in a ceramic plant



The UNIDO-Czechoslovakia Joint Programme has its headquarters in Pilsen. Its activity is backed by the Czechoslovak ceramic industry with its long tradition and developed research base. It represents a high phase of multilateral co-operation with UNIDO and developing countries which appreciate its comprehensive scientific and technical assistance.

Co-operation is realized in several ways:

- fostering twinning arrangements between relevant research institutions both in Czechoslovakia and developing countries
- individual and group training programmes
- organization of international technical workshops
- carrying out tests of indigenous non-metallic raw materials and subsequent technological research
- advisory engineering and field advisory missions
- advisory activities in the field of energy conservation in industries
- industrial inquiry services Industrial and Technological Information Bank INTIB node
- application of non-metallic sorbents in agriculture and environmental protection
- advanced ceramics programmes
- integrated utilization of non-metallic minerals

The above assistance has been provided to both governmental bodies and industrial corporations in more than 90 developing countries of Europe, Asia, Africa, South America and the Oceania. The Joint Programme has initiated many actions and projects among which those related to integrated exploitation of industrial minerals are of relevance to this catalogue. Convincing results in this field have at-

▲ *Participants from developing countries during a workshop focussed on the application of non metallic sorbents in agriculture*

tracted the attention of many countries to apply natural sorbents as soil conditioners and cleansers of waste water.

The editors of the catalogue are ready to provide necessary information in detail and advices of assistance, if need be, and the UNIDO-Czechoslovakia Joint Programme itself can mediate any assistance concerning the application of non-metallic materials in agriculture and environmental engineering.



▲ *Foreign experts visiting the Joint Programme inspect the environmental impact of kaolin mining*

For further information please contact:

**UNIDO/CSSR Joint Programme,
Non-metallic Industries, Pilsen**
P. O. Box 211
305 11 Plzeň, Czechoslovakia
phone: 22 43 38
telex: 15 44 85 UNCS C

**Research Institute for Ceramics,
Refractories and Non-metallic Raw
Materials, Pilsen**
P. O. Box 211
305 11 Plzeň, Czechoslovakia
phone: 357 81-88
telex: 15 45 22 VUK C

State Farm Plzeň-Křimice
322 00 Plzeň-Křimice
phone: 822 56