OCCASION

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

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
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 human activities such as higher hygienic requirements, application of detergents, emballassment 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
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 offences 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 impacts. 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 movement 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 GLAUCAG
\textit{features:}

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

\begin{align*}
l & 2 \text{ cm} \\
\sigma & 20 \text{ cm}
\end{align*}

\text{now doing well in permeable soils on}
Bentonite substrates support colour

rockeries, ground cover, 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, 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 at the depth of 20-30 metres lowers the noise by 10-12 decibels.

Phlegmogenic Activity

It is known that the amount of microorganisms in the air is up to 80 times lower in parks and forests compared with atmosphere in cities. This is due to the fact that some of the plants release different anti-microbial, easily evaporable matters, which are called phytomes. The most important plants are jumpers, maples, pine trees, hickory and rowan 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 plants lower 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 forests compared with unforested areas. The average humidity gets increased up to 20%, during sunset time.
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 litter, 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 reutilization 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 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.
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-metallies are:

EXPANDED PERLITE

Expanded perlite of coarser composition is used to reclaim by making lighter the clay soils and for reclaims 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

Hickeli

H Hickeli

Juniperus sabina
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 drainage 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: 3 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**

**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.

---

**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 3–10 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 m, G: 15–20 cm

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

*application:*
As solitaire, trees in rockeries and graves.
The large variety of growing plants requires appropriate substrates which vary according to the genus 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/m³ 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 compacted 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 15–20 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, 33% capillary water, 57% air. Rhododendron obtusum, Magnolia soulangeana and Camellia japonica rooted up well in bare perlite but multicomponent mixtures did better.

<table>
<thead>
<tr>
<th>PERLITE</th>
<th>HYGROMULL</th>
<th>TURF</th>
<th>POLYSTYRENE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

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 cultivarants.

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 cultivarants, 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.

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 cultivarants, 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
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, columnar 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 foliots 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:
Culivar has light grey bark, the trunk has branches from the base. The cones are as long as 6 cm, silverish blue-green and twisted upwards sickle-like.
H: 25-30 m, G: 50 cm
S: 3, 4 m, G: 15 cm
demands:
Culivar requires full sun sitting 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 culivars 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 dishiking grass growing around its base.
application:
Culivar does make a very useful screen or hedge. The specimen becomes a very large tree and, therefore, it is rarely planted as a solitaire.
שומך מוכך

שומך מוכך

שומך מוכך
CHAMAECYPARIS OBTUSA NANA GRACILIS
characteristic features:
Cultivar of dwarf habit with branches arranged in conical 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-blush, turning grey-blue in winter.
H: 2 m, G: 15 cm
S: 4 m, G: 10 cm
demands:
The cultivar dislikes scorching heat, overdried soil and exposure to winds. It does well on permeable bentonite substrates and protected sitings.
application:
For larger rock gardens and as solitaire.

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 bentonite substrates.
application:
It effects as solitaire or in larger rock gardens.
GINKGO BILoba

This does not in any way resemble
a large picture of a conifer but in
characteristics, foliage
shape, foliage is pair
leaves of fresh green, turning
in autumn. The only species represent
and butter yellow in the autumn
is Ginkgo Biloba, which is
differently leafed and of easy culti-

It likes full sun as far as half shadow.

As valuable and impressive solitaire

ed. 4 to m. 6. 20 cm
S. 2 10 m. 6. 10 cm
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-like. It has compact, berry-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**. 8 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 settings.

application
HiBernica

Juniperus Communis
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:
**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 erect branches, foliage of dark green with bluish tint.
**H:** 2 - 2.5 m, **G:** 15 cm
**S:** 3 m, **G:** 40 cm
**demands.**
It does well in permeable soils in 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 OLD GOLD**

**characteristic features.**
Evergreen conifer of stout habit with brass-golden foliage.
**H:** 2 - 2.5 m, **G:** 10 cm
**S:** 2.5 - 3 m, **G:** 30 cm
**demands.**
Very hardened cultivar, it likes sun or mild shade and does well in permeable fertile soils.
**application.**
It effects as solitary, in larger rockeries and groupings used also for mobile greeneries.

**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:** 1 m, **G:** 20 cm
**S:** 10 m, **G:** 40 cm
**demands.**
Tolerant cultivar, it likes sun and does well in perlite-lightened substrates.
**application.**
As solitary, for wide hedges and groupings.

**JUNIPERUS CHINENSIS MORDIGAN AUREA**

**characteristic features.**
The cultivar is of wide compact growth with scale-like foliage of yellow tints which turn bronze-golden in the winter time.
**H:** 2 - 2.5 m, **G:** 20 cm
**S:** 10 m, **G:** 15 cm
**demands.**
It does well in sunny positions and light permeable substrates.
**application.**
For larger rock gardens, for groupings and mobile greeneries.

**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 towards 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:** 10 m, **G:** 40 cm
**demands.**
It does well on permeable soils, bentonite in substrates supports colouring, it likes sun and resists frost.
**application.**
It effects most as solitary contrasting nicely with dark backgrounds. It can grow above 1 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:** 0.5 m, **G:** 3 cm
**S:** 2 m, **G:** 20 cm
**demands.**
Tolerant cultivar that likes sunny positions and permeable soil, sandy soil. can be improved by bentonite.
**application.**
As solitary, for rock gardens, as ground cover tree.
μstrarups

3a occidentalis
UJA OCCIDENTALIS
LONYANA

**External features**

- It is a close shape, slightly rounded. Twigs are flat, light green. It tolerates cutting well.

**Height**

- 1.5 m. (5 - 6 ft)
- 2 m. (6 - 10 ft)

**Suitable cultivars**

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

**Uses**

- Hedges in groups.
**JUNIPERUS SABINA GLAUCA**

**Characteristic features:**
The conifer has dense irregular almost creeping branches, the colour of foliage is a grey-blue.

**Dimensions:**
- **H:** 1.5 m, **W:** 10 cm
- **S:** 1.5 m, **D:** 15 - 20 cm

**Surround:**
Substrates added with bentonite support blue colouring. It likes sunny positions.

**Application:**
In groupings and for higher foreground elements, also as solitary 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 exposure to light, permeable substrates suitable, bentonite adds to its build-up application.

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

---

**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** 1.5 m, **G** 15-20 cm

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

**application**
As solitaire, for rockeries and gravels, 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** 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:
Compact in shape, the conifer has erect, slender twigs with scale like foliage of bluish tint, the twigs are fawn-white.

**H** 4 m, **G** 15 cm

**S** 1.5 m, **G** 1-5 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 stamens.

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 settings

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.
PARTRITA

PERUS VIRGINIANA
**MICROBIOTA**

**MICROBIOTA DECUSATA**

**characteristic features:**
- Originates from Siberia. The conifer is very tidy having completely prostrate habit. Leaves resemble thuja. Scale-like leaves are of green bronze with bronze colouring in winter time.
- Tolerant conifer, bentonite supports hibernation.
- Application: rocks gardens, mobile verdure, graves, ground covers.

**PICEA**

The picea-genus are evergreen trees, shrubs and dwarf shrubs. Roots are shallowly placed. The plant is sensitive to root rotting. Demands for soil quality are worse than for fir planting. They are growing better under pure and humid air and in the wetter soil. Cones are opening, 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.
- Tolerant cultivar, being well influenced by dewing 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.
- 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.
- 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.
Solitary and also in clusters.

Application

and sunny places. Shade is tolerated badly. If the perennials are not cut back after flowering demand

S 5 - 2 M 10 cm
H 20 M 15 cm

Shape: Flat grown, upright, to 15 cm.

Some are 25 to 40 cm long: Some are more slender, radial. Positively emerging, are rigid, funnel-shaped, radially positioned, are almost horizontal in place. Like whisks. Needles

 Covered with brown or dark brown leaves and branches

by conical up to columnar

Picea pungens glauca

CA
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 greener.

PICEA PUNGENS GLAUCA
KOSTER
characteristic features:
Regularly conical tree with silver-blue pine needles
H: 10 - 15 m, G: 10 cm
S: 1 - 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 to 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 modest 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 knotted through, needles are found in groups of five, of dark green colour, whitish dotted.
H: 2 - 4 m, G: 10 - 15 cm
S: 1 - 2 m, G: 10 cm
demands:
Tolerating well of poor and even stony soils.
application:
Solitaire, arranged mobile greener.
PINUS SILVESTRIS
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 different soils.

Application:
Solitaire and in groups.

PINUS STROBUS

Characteristic features:
Tree of high growth with wide crown at top which is wide when old with horizontally growing branches. Needles are blue green, 8-10 cm long, soft straight and thin in groups of five. Cones are brown up to 20 cm long, closely cylindrical at the base, purple at the top, the trunk is grey green bark till old age.

H: 20 m, G: 60 m
S: 10 m, G: 25 cm

Demands:
Comes to sandy, clay permeable soils, stands in semi-shade stands.

Application:
Solitaire, groups, suitable for planting on larger area.
THUJOPSIS

THUJOPSIS DOLOBRATA VARIEGATA
characteristic features:
Shrubby tree with thin trunk, short-like branches with flally 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 sitting, 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 sittings 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: 5 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, perpendicular stretching. Needles are radially positioned, 2 - 3 cm long, black green colour.
H: 8 m, G: 15 cm
S: 5 - 2 m, G: 5 cm

demands:
There is a need of shielding for young plants which must not be let to overfly. 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, perpendicular stretching. Needles are radially positioned, 2 - 3 cm long, of fancy gold yellow colour.
H: 8 m, G: 15 cm
S: 5 - 2 m, G: 5 cm

demands:
It requires shadow when young. The plant does not stand overdryng. 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 m, G 5 cm
S 8 - 10 m, G 25 - 40 cm

requirements
Adequate wet and fertile, permeable soils agree
with Taxus. It likes half shadow sittings and tolerat
es cutting well
application
Solitary, 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: 15 - 20 cm
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 m
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
A Occidentalis Gold

The features growing cultivar, needle-like leaves transform to scale-like type when older are gold yellow when budded out, later low and of copper shade during winter.

0.6 - 15 cm
m. 0 - 10 cm

A low demanding cultivar, however so dry standing He is growing at a sun-shaded place. The foliage colours best in soil enriched with bentonite.

Use for rock gardens...
THUJA OCCIDENTALIS
SMARAGD
characteristic features:
The variety grows in a slim, conical shape, with sparse branches and fresh, green foliage.
H 1.5 - 2 m, G 15 - 20 cm
S 1.5 - 2 m, G 5 - 10 cm
demand:
The plants grow best at sunny or slightly shaded standings, in wet and permeable soils.
application:
As a solitary, for green walls.

THUJA OCCIDENTALIS
SPIRALIS
characteristic features:
Cylindrical of a slim, conical shape with very short branches, shrivelling twisted in spirals.
H 10 - 15 m, G 10 - 15 cm
S 1.5 - 2 m, G 5 - 10 cm
demand:
Sunny up to slightly shaded standings suits better.
application:
As a solitary or for smaller groups.

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 1.0 m, G 3 - 5 cm
demand:
Permeable, not too dry soils, sunny, up to slightly shaded standings. Frost-hardy variety
application:
As a solitary and for rock gardens.

THUJA OCCIDENTALIS
WAREANA
characteristic features:
Center of a dense, conical shape, main branches stretched out, small branches widely fanwise arranged.
Fresh green
H 1.0 m, G 15 - 20 cm
S 2.0 m, G 10 - 15 cm
demand:
Sunny or slightly shaded standings, permeable soils
application:
As a solitary for green walls and for groups.

THUJA OCCIDENTALIS
WAREANA LUTESCENS
characteristic features:
Center of a dense, conical shape, main branches stretched out, small branches widely fanwise arranged, light yellowish foliage.
H 1.0 m, G 15 - 20 cm
S 2.0 m, G 10 - 15 cm
demand:
Sunny or slightly shaded standings, permeable soils
application:
As a solitary, for hedge, for groups.
SUGA CANADENSIS

Sugi, or Japanese cedar, is a large coniferous tree native to Japan. It is known for its distinctive shape, with a straight trunk and a dense, pyramidal crown. Sugi is a valuable timber tree, with wood that is strong and durable. It is also used in landscaping and as a street tree. The foliage is evergreen, with needle-like leaves that are dark green and glossy. The flowers are small, white, and appear in clusters in early summer. The fruit is a small, red berry that matures in late summer.

Mature trees can reach heights of up to 100 meters and have a diameter of up to 1 meter. The bark is dark brown and rough, with deep furrows. Sugi is a long-lived species, with some trees reaching ages of over 1000 years. It is a valuable species for reforestation and urban landscaping.
RHODODENDRONS

Rhododendrons are bushes of low, sometimes low lying 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 at 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

demands
Peat substrates at 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

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

WHITE

Features:

Tall, white flowering cultivar.

Height: 20 cm

DENDRON

UM JACkSON II

Features:

Species of globular growth, flowers

Buds are rosy, white blooming. This
CREST FLOWER with a yellow eye
IRIS BARBARA — light up to dark carmine red
IRIS FORSYTHIANA — bronze yellow
IRIS RSH — white with a yellow eye
ROYAL COMMAND — dark carmine red
ALAN MARRE
AL/AC — expressive flowers of red to
white, smelling
IRIS BALI — dark red, expressive flowers.
6-8 cm. G. 15 cm.
15 cm. G. 15 cm.

The cultivars require permeable peat substrates.
Without calcareous, they like sunny up to semi-shadings.

Application
As a solitary, for groups, or combination with green cultivars or rhododendrons.
REPENS - HYBRIDS

RHODODENDRON
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 or 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 80 cm
S 2.5 m, G 30 cm

demands
Perennial, fertile soils of acidic reaction, without calcium
application
Decorative bush for rock gardens, as a solitaire and for groups.

▼ ▼
CHRIS THUNBERGII

A

deciduous thorny shrub with dense branches.

Young rounded foliage has distinct yellow

colour that turns green-yellow in shade. It
dehorns slowly.

Height

5 cm, G: 5 cm

C: 5 cm

Fruits on the sun supports colouring.

Found in edges and groups.

CHRIS THUNBERGII ▶
PURPURREA
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 1.5 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 self-supplying with civil engineering works, building maintenance and technical recultivations and mechanizations. 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 cutters. 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.
The plant Horticultura producing cash plants takes up about 5 hectares in the locality Plzen-Křimice. There are situated glasshouses, japons and loft 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 intertwined 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, strehza.

Potflowers, mainly azalea, camelia, fucs, croton.

Heather plants such as azalea, rhododendron, heath bell, heather, teneflora, pieries.

Low broad leaf shrubs among which berberis, various cotoneasters and potentilla are favourite.

Conifers represented by a wide variety of cultivarants.

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 laboratories
This institute is the research and scientific basis of the Czechoslovak Ceramic Works. It 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
- exercise, 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 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 Brána, Karlovy Vary, Rájec-Jeřebí and Borovany.

IBM personal computer is widely applied for research projects.

Derivatograph apparatus for thermal analysis.
Mr. Domingo L. Sazon Jr., Director General of UNIDO, inspecting the UNIDO Czechoslovakia Joint Programme, Non metallo Industries, Pilsen.

Fellowship of Chinese engineers - non metallo 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 attracted 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 advice 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.
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