


# 内蒙古自治区


## 防沙治沙主要技术措施简介

A Brief Introduction to Technical Measures of  
Desertification Prevention and Control in Inner Mongolia






内蒙古横跨东北、华北、西北，是一个高原型的地貌区,大部分地区海拔**1000**米以上，以温带大陆性季风气候为主，年平均气温**0-8℃**，年降水量**50-450**毫米之间，无霜期**80-150**天，年日照时数**2700**小时以上，大兴安岭和阴山山脉是全区气候差异的重要自然分界线。







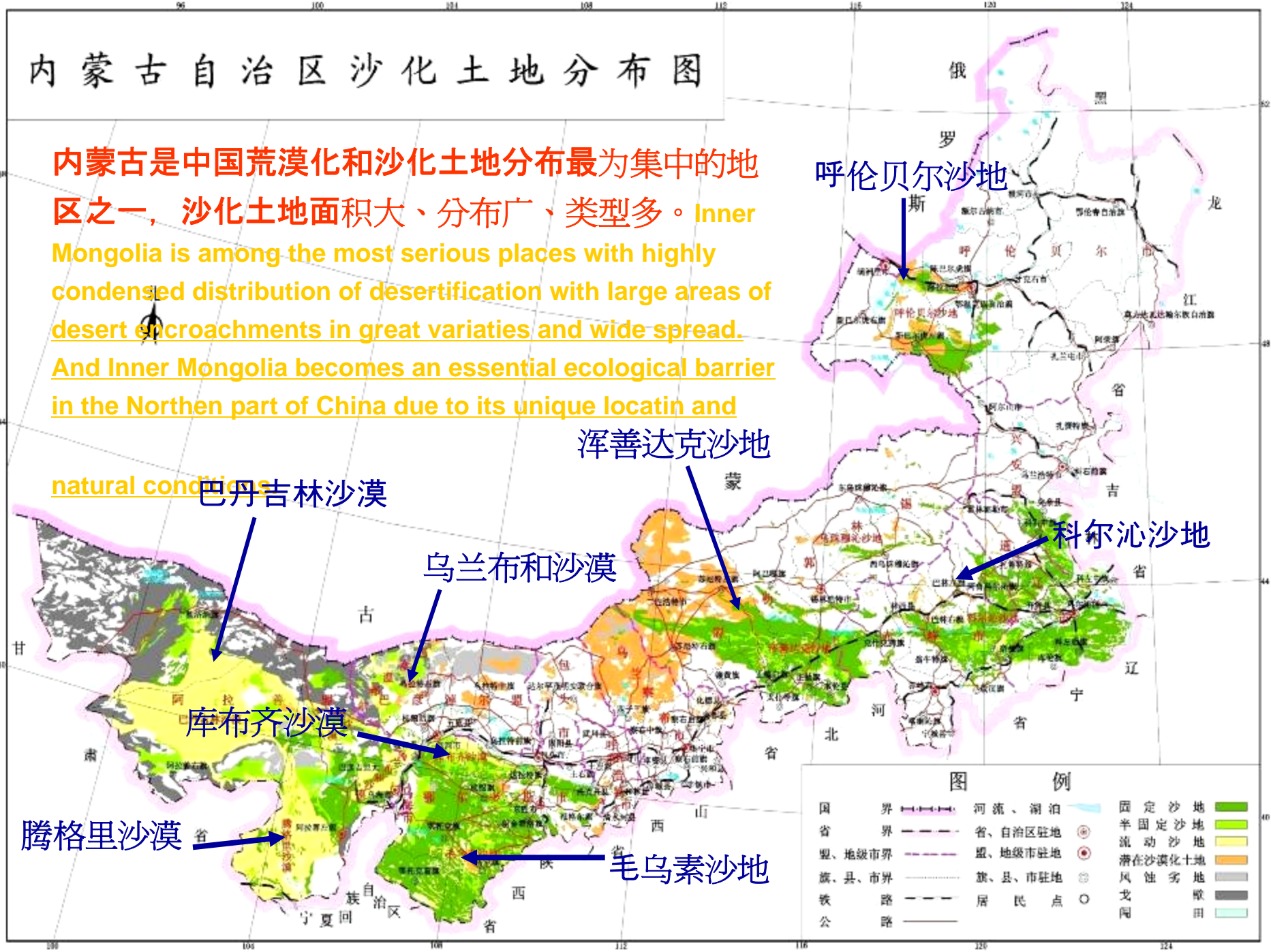
Lying across China's Northeast, North China and its Northwest, Inner Mongolia Autonomous Region forms a plateau in terms of topographic features. With an altitude of more than 1000 meters above sea level for most areas, the region mainly falls into a temperate continental climate type. The annual average temperature for this area ranges from zero to eight degrees centigrade and the annual precipitation is within the scope from 50 to 450mm. With a frost-free period of between 80 to 150 days and total hours of sunshine of 2700 hours, the Greater Hinggan Mountains and Yinshan Mountains form the natural boundaries for areas of different climate types within the region.




# 内蒙古自治区沙化土地分布图

内蒙古是中国荒漠化和沙化土地分布最为集中的地区之一，沙化土地面积大、分布广、类型多。Inner Mongolia is among the most serious places with highly condensed distribution of desertification with large areas of desert encroachments in great varieties and wide spread. And Inner Mongolia becomes an essential ecological barrier in the Northern part of China due to its unique locatin and


natural conditions








防沙治沙工作以国家“三北”防护林体系建设、天然林保护、退耕还林、京津风沙源治理、退牧还草、水土保持等生态重点工程为依托，按照“预防为主、科学治理、合理利用”的方针，实行全民尽责，全社会参与。





For years, in accordance with the principles of prevention first, a scientific control and rational utilization, work of desertification prevention and control has been conducted nationwide by planting protective belts in China's Northeast, North China and its Northwest, protecting virgin forest, converting farming land to forestry, controlling the sand and dust source in Beijing and Tianjin, converting pastures to grasslands and conserving water and soil as well.













# 水土保持林工程








## 赤峰市宁城县老鹰山治理工程






# 全社会参与






根据内蒙古的立地类型和自然气候特点，划分为沙地、沙漠、退化草原、农牧交错等治理类型区，针对不同类型区的特征，采取相应的技术措施。








The areas of desertification within the region could be divided, for the benefit of a better control, into several types: sand land, deserts, deteriorated grasslands and agro-pastoral mixture in the light of its unique geographical and climate characteristics and at the meantime, different technical measures are taken for each type accordingly.



在生态保护方面，主要是采取转变农牧业生产经营方式，封禁保护等措施，减少人为活动对生态的影响。在生态治理方面，主要是采取人工造林、封山（沙）育林、飞播造林等措施，增加和恢复林草植被。







In terms of ecological protection, protective measures taken are focused on shifts in operation methods of agriculture and husbandry, closed protection and others for the purpose of reducing the adverse influences of human activities on the environment. As for bionomic control, measures like artificial forest planting, reforestation, natural afforestation enhanced by enclosing the hills and sand land are practiced frequently in order to recover and increase the tree and grass vegetation.





人工造林




封山(沙)育林



飞机播种造林





人工造林其技术要点主要是适地适树、按照不同林种选择树种、优先使用乡土树种、合理配置混交林结构。

The main technical point for the artificial forest planting is to choose the suitable ground for a certain kind of tree or tree seed and the suitable tree seed for certain purposes required of the future woods. And another principle is to lay priority on the local ones and to optimize the arrangements of mixed forests.





山杏



沙刺



黄柳



柠条



杨柴



梭梭







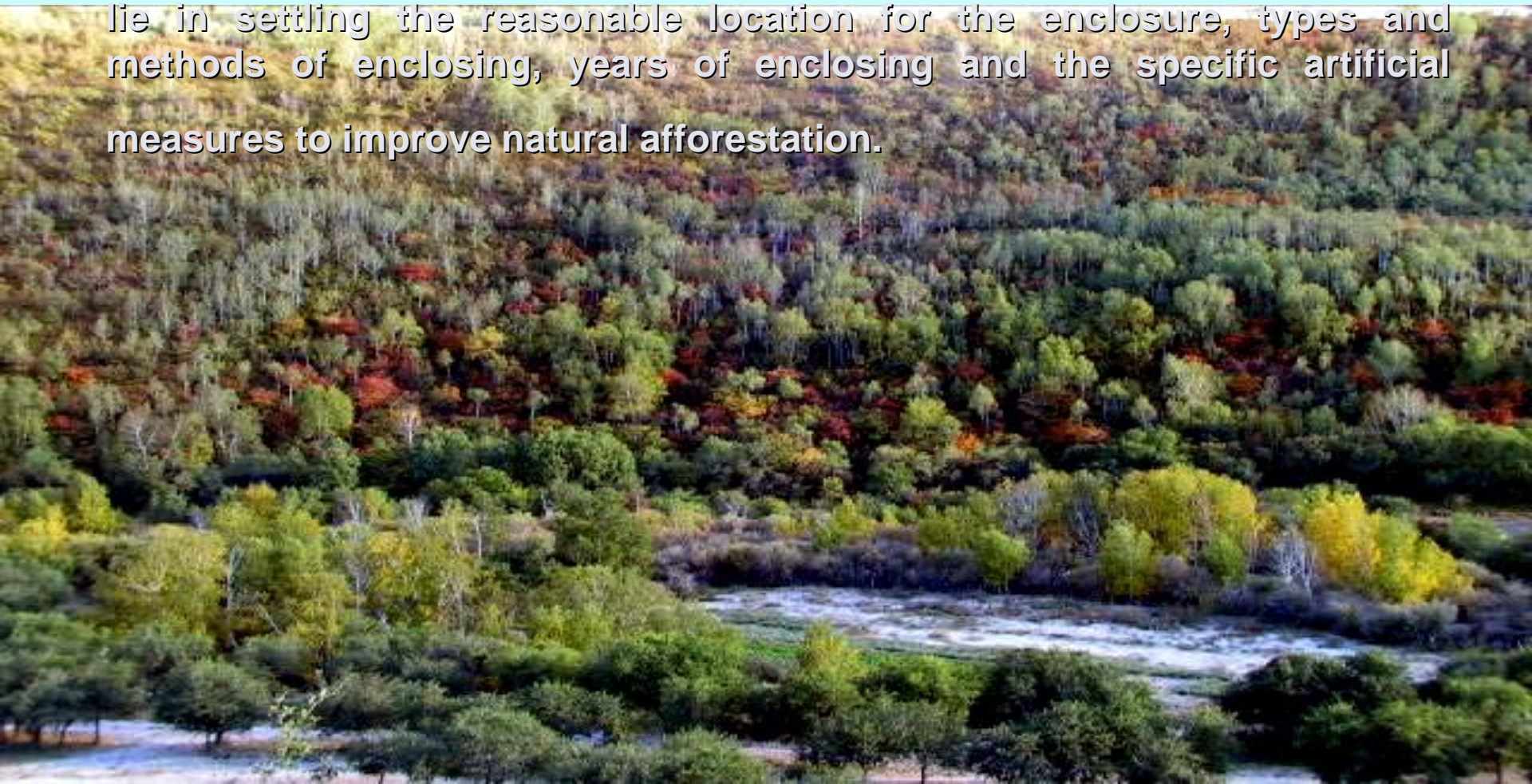
# 抗旱造林图2





**封山（沙）育林主要其关键技术要点是合理确定封育区、封育类型、封育方式、封育年限、人工辅助育林措施等。**

The main technical points for mountains/sand enclosing for enrichment lie in settling the reasonable location for the enclosure, types and methods of enclosing, years of enclosing and the specific artificial measures to improve natural afforestation.



飞机播种造林其主要技术要点是播区选择、植物种选择、种子处理、播量确定、播期选择、地面处理、飞行作业等。

The main technical points of aerial afforestation focus on a best choice of the specific area to undergo the procedure, suitable tree seeds, amount of seeds to be scattered, seed treatment, seeding time, ground handling and the seed scattering in the flying, etc.



飞机播种造林







# 一、沙地类型区主要治理模式

Major Control Methods for Sand Lands







内蒙古分布有呼伦贝尔、科尔沁、浑善达克、毛乌素四大沙地，在治理中主要采取了三结合、三为主的治理措施，即乔灌草相结合，以灌为主；造封飞相结合，以封为主；生物措施和工程措施相结合，以生物措施为主。采用了以下几种典型的治理模式：







There are four largest sand lands in Inner Mongolia: Hulunbuir, Horchin, Onqin Daga and Mu Us. And control measures taken center at three dominants and three combinations that is the combination of trees, shrubs and grass taking shrub to be the dominant, and the combination of afforestation, closure and aerial planting with closure as the dominant, and the third combination of bio-control method and technical measures with the bio-control method to be the dominant. The typical control methods are listed as follows:





呼伦贝尔沙地



科尔沁沙地



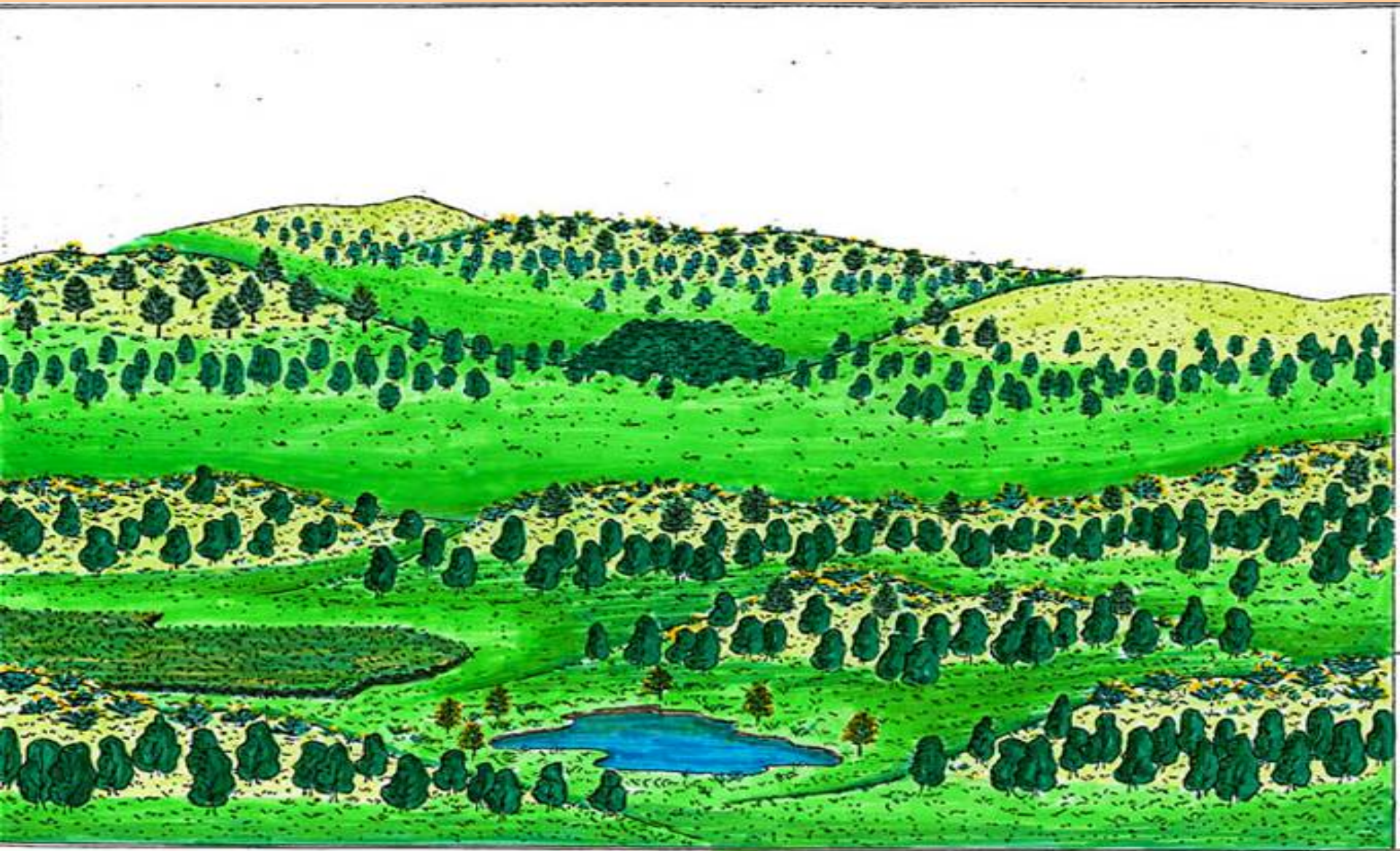
浑善达克沙地



毛乌素沙地



# 流动、半流动沙地综合治理





# 锡林郭勒盟流动、半流动沙地综合治理





## （一）科尔沁沙地生物经济圈综合治理模式

生物经济圈是沙区以户或村为单位，采取水、草、林、机、粮（料）五配套措施，进行综合治理。生物经济圈由核心区和保护区组成，面积以**4-10**公顷为宜。核心区不小于**2**公顷，包括房舍、棚圈、农田、果园、人工草场、水利配套设施等。核心区周围营造乔灌结合的防护林带，一般乔木**3-4**行，乔木两侧各栽植灌木**2-3**行。保护区位于核心区外围，其面积应为核心区**1—4**倍，保护区外围设置机械围栏或生物围栏，保护区内以封沙育林育草为主。采取封闭式管理，集约化经营。

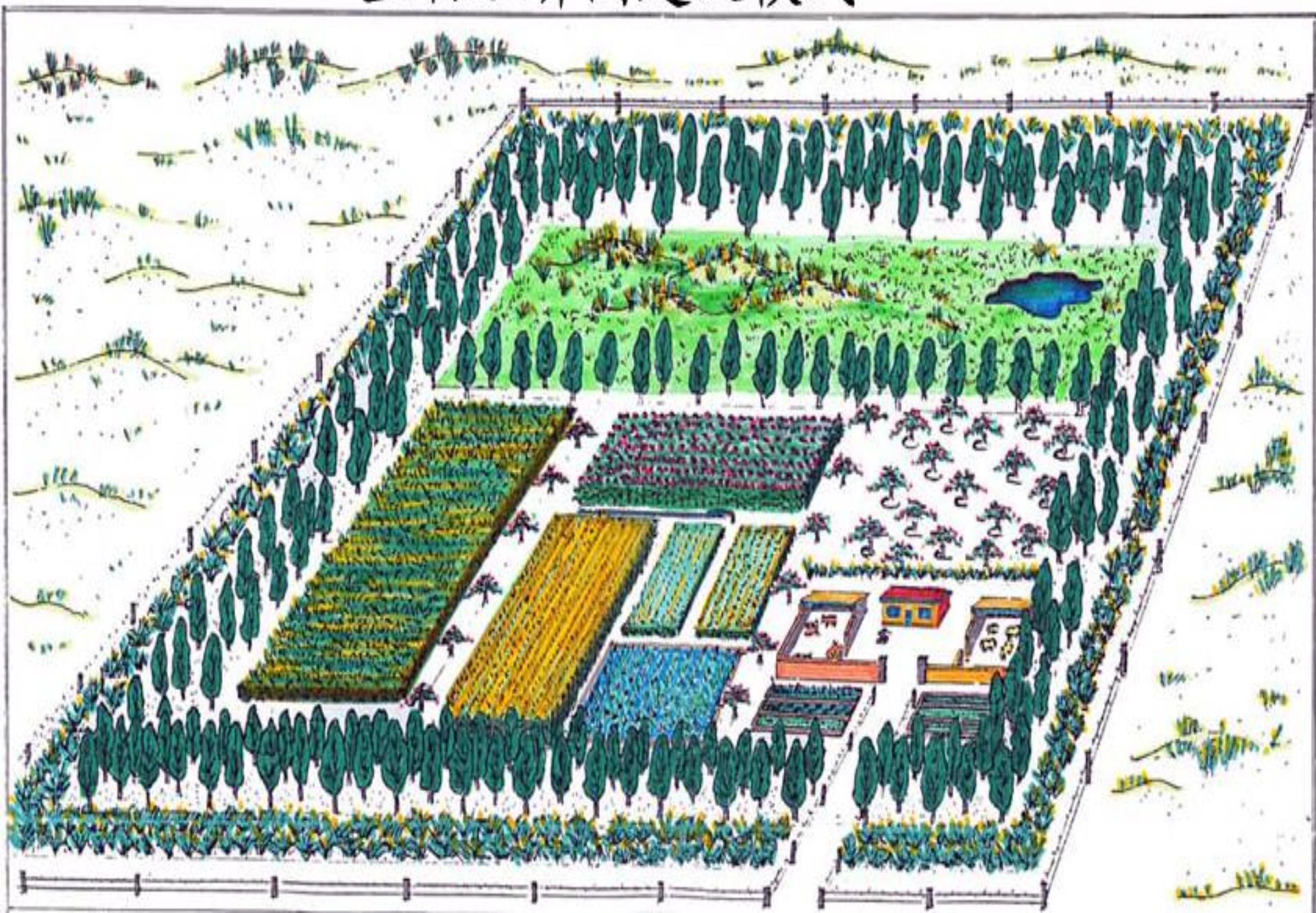
# **Comprehensive Control Mode for Bio-economic Sphere of Horchin**

## **Sand Land**

Bio-economic sphere refers to the section in the area of desertification with household or village constructed on the basis of a five-element coordination involving water, grass, woods, machinery and grain(feed) for a comprehensive control. with an area of 4 to 10 hectaress,the Bio-economic sphere is composed of two sections: a core section of no less than 2 hectaress and a protective section, once to four times in size than the core section. There include housing, shelters for farm animals, agricultural land, orchards, sown pastures and irigation facilities, etc. in the core section around which is a section of protective woods of trees and shrubs. Generally, there are three to four rows of trees and two to three rows of shrubs on either side of the tree section. Mechanical fences or biological fences are equipped outside the protective section; work of tree and grass planting to fix sand are mainly conducted within the section. The whole sphere is in a closed and intensive management.



# 生物经济圈建设模式





## （二）科尔沁沙地再生沙障固沙模式

在流动、半流动沙地，设置沙障设置形式为行列式和网格状。网格式配置规格**4×4m**，局部沙丘用**2×2m**，平缓沙丘适当放大到**6×6m**。沙障植物种以萌蘖能力强的灌木为主，选择**1—2**年生枝条，截成长**0.8—1m**的扦插条。种条随采随用，及时假植，采割后种条不宜超过**24**小时，有水源条件的地方，最好浸泡一昼夜，埋设时种条上留**20cm**。我区一般在每年春季**3-4**月、雨季**6—7**月和秋季**10**月至封冻前进行。沙障设置后，第二年可在网格内进行人工造林。





# **Sand Fixing Mode of Regeneration Barrier Bars in Horchin**

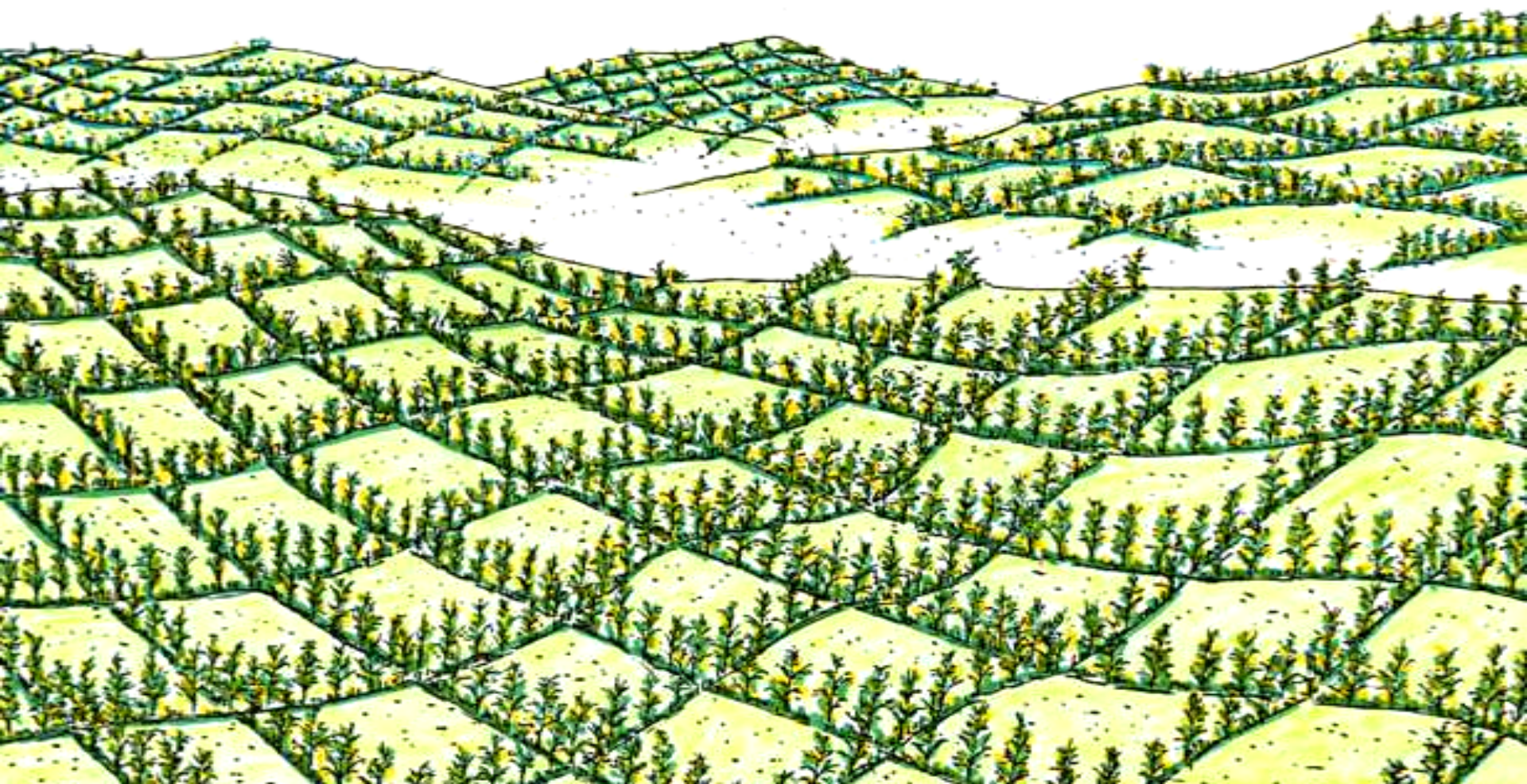
## **Sand Land**

Barrier bars are set in lines and rows or in grids. The latter type is favored in the distances of  $4 \times 4$  meters and  $2 \times 2$  meters is partly applied to plantation on the dunes. For mild dunes, the distances could be enlarged to be  $6 \times 6$  meters. Plants for the barrier bars shall be shrubs easily to sprout. Annual or biennis branches are to be picked out and cut into cuttings at a length of 0.8 to 1 meter. The cuttings shall be cut for immediate use and temporarily planted in wet sands and shall not be kept for over 24 hours after cutting off. It would be better to sock the cutting in water for 24 hours at places where water supply is available. And a length of 20cm shall be kept above the ground level. This kind of plantation is conducted mainly in March and April in spring and June and July in the rainy season and at the period of time between October and freeze-up date in autumn. Reforestation could be practiced in the grids in the second year when the barrier bars are set.





# 植物再生沙障治沙模式





# 再生沙障设置



### （三）科尔沁流动沙地植被恢复模式

在流动沙丘、平缓流沙地以及风蚀坑区域适宜此模式。流动、半流动沙丘和地下水位较深的丘间低地，栽植耐旱灌木，灌木以一年生苗为宜，呈带状栽植，带距**2m**，与主风方向垂直，株行距**1×1m**。在固沙三年后的灌木丛间再造乔木林。地下水位相对较浅的丘间低地和风蚀坑，可直接栽植乔木，在迎风坡脚部栽植，以达到前挡后拉的效果。





# **Vegetation Recovery Mode for Migratory Sand Land in Horchin**

This mode is applicable to migratory dunes, mild drift sand and areas of wind erosion pits. Drought-enduring shrubs are planted in areas of migratory dunes, semi-mobile dunes and low lands among dunes with a low level of underground water. The shrubs would better be yearlings and planted in the shape of belts and the distance between two belts of shrubs is 2 meters. Besides the belts shall be at right angles with the prevailing wind direction and the distances between two rows and two shrubs are one meter respectively. In the section between two shrubberies, timber forests are to be planted three years later. Trees could be planted at the low lands among dunes with a low level of underground water and wind erosion pits. Additionally the best position for planting should be the foot of the windward slopes so that the moving of sand is stopped in front and dragged at rare.









#### （四）科尔沁沙地宽林带大网格固沙模式

在沙地腹部，适宜于固定、半固定沙丘，地下水较丰富的区域。骨干林网的规格一般为**1000m×1000m**，林带走向与主风向垂直。主林带宽**50m**，栽植**8-12**行树木。林带可为乔木或乔灌混交。林网内可封沙育林育草，也可以林带划方切块，建**16**个**250m×250m**的小网格，林带宽**12-24m**，栽植乔木或灌木**4-6**行，小网格内种植牧草。树种选择一般选用耐干旱、耐瘠薄的树种，随整地随造林。



# **Broad-forest-section and grand-grating Mode for Sand**

## **Fixing in Horchin Sand Land**

This mode is applicable to stabilized dunes, semistabilized dunes and areas with rich underground water in the middle part of the sand land. The skeleton forests shall be 1000 meters in length and breadth as well and at right angles with the prevailing wind direction. The main forest section is made up of eight to twelve lines of trees with a breadth of 50 meters in total. The forests could be trees or trees mixed with shrubs. The area within the forest could be used to plant trees and grass to fix sand or divided into 16 small grating sections of  $250\text{m} \times 250\text{m}$  by tree belts of 12 to 24 meters wide in four to six lines of trees. And herd's grass grows in the small grating sections. Trees for the forests shall be draught-enduring and poor-soil-enduring ones. Ground preparing and tree planting shall be conducted simultaneously.













## （五）浑善达克沙地封沙育林育草恢复植被模式

在固定和半固定沙地，对封育区四周架设机械围栏，围栏一般采用七道钢丝，围栏桩用水泥桩或角钢，桩埋**50-60cm**，桩间距为**10m**，在围栏顶**1.2m**处加挂一道刺丝。部分裸露空地，进行人工补植补播。按照原生群落的自然模式营造乡土树种。天然下种的封育区，在母树种子成熟落种前，对落种区域进行带状或块状松土、除草。在封育区内对具有萌芽、萌蘖能力的灌木，老化衰退枝条，进行平茬复壮。平茬时间一般在晚秋到冬末茬。平茬周期根据各树种的生物学特性确定。



# Vegetation Recovery Mode for Onqin Daga Sand Land by

## Sand Fixing and Tree-grass Planting

This mode is applied to stabilized. Mechanical fences are to be equipped around the section, which generally are of a seven-steel-wire types. And the piles for the fences shall be concrete or angle steel ones with a length of 50 to 60 centimeters buried underground and a distance of 10 meters between two. At the position of 1.2 meters above the ground a length of barbed wire is to be attached. Local tree types shall be planted at bare vacant grounds within the section in accordance with the natural model of the primary community. In those sand fixing and tree planting sections where reproduction of trees is relied on natural seeds, the ground sections where the seeds are to fall down shall be undergoing soil cultivation and weeds removal procedures. Coppicing is required for shrubs with degraded branches but able to germinate or sprout. Coppicing is generally conducted in late autumn or late winter And the coppicing period is determined by the biological features of the trees concerned.







## （六）浑善达克沙地飞播造林模式

一般在地下水位**0.5-10m**，植被覆盖度**3%-12%**，丘间低地开阔，沙丘相对高差小于**15m**的沙地，适宜采用飞播造林。播区面积集中连片，一般在**5000**亩以上，播区内宜播面积应占**70%**。最佳飞播期在雨季到来之前，内蒙古一般为**6**月。播种量为**7500g/公顷**左右，通常采用乔灌草或灌草混播。播带长按照载重量计算。飞机作业时，一般航高为**50-80m**，播幅**40-50m**。为使飞播落种均匀，减少漏播，飞播时每条播幅两侧要各有**15%**的重叠。





## **Aerial Planting Mode for Onqin Daga Sand Land**

Aerial planting is applicable to sand lands with an underground water level of between 0.5 to 10 meters, vegetation coverage of between 3 percent to 12 percent, broad low lands between dunes and the relative height difference of the dunes less than 15 meters. Moreover, the sections available for aerial planting should be in close succession and accounts for 70 percent or above of the total size which shall be no less than 5000 mu. The best time for aerial planting shall be prior to the coming of rainy season, and that will be in June in Inner Mongolia. And the amount of seeds to be scattered shall be 7500g per hectare in a mixture of tree seeds, grass seeds and shrub seeds or of grass and shrub seeds. The length of the seeding band is calculated in terms of capacity. In operation, the fly height of the plane is generally between 50 and 80 meters, sowing width 40 to 50 meters. For an even seeding, there shall exist a overlapping section on either side of the sowing width and the width of each overlapping section equals 10 percent of each sowing width.









**飞播造林前**



**飞播造林后**

## （七）浑善达克沙地流动、半流动沙丘 综合治理模式

对以流动沙丘、半流动沙丘为主，多种立地类型交错分布的区域，因地制宜地采用多种树种、多形式的治理措施。丘间低地选择乔木造林，沙丘上选择灌木造林。流沙地上先设置沙障，然后营造固沙林。下湿地及一般草场播种优良牧草。造林种草后严禁放牧，灌木林根据其生物学特性适时进行平茬。





# **Comprehensive Control Mode for Migratory and Semi-migratory Dunes for Onqin Daga Sand Land**

For areas with migratory and semi-migratory dunes as the main geographical feature and in staggering distribution with other features, measures of multiple forms and multiple tree types shall be taken accordingly. Forests are applicable to low lands between dunes; shrubberies are for dunes; and for the migratory sand lands, barrier bars are to be set before sand fixing plantations. And fine pasture plants grow on lower wet soil and general pastures. Gazing is forbidden. Coppicing for shrubberies is conducted timely in accordance with their biological features.



# 浑善达克沙地治理

## 正蓝旗桑根达来镇柴达项目区治理前后对比





# 赤峰市林西县流动、半流动 沙地治理前后对比



## （八）毛乌素沙地乔灌混交固沙模式

毛乌素沙地的丘间低地，栽植灌木和乔木，或乔灌结合，能迅速有效地固定沙地。灌木技术要点：成带扦插沙柳，每带由两行组成，行距**1m**，株距**0.5m**，插条长**50cm**，一般高度在**3m**以内的沙丘，春季造林宜空留出**6-7m**，秋季造林宜空留出**10-11m**。**3-7m**高的中型沙丘，春季造林应空留出**3-4m**，秋季造林应空留出**7-8m**。乔木栽植主要为旱柳、樟子松等树种，株行距为**2m×3m**。乔灌混交造林一般为乔木和沙柳混交效果最好。





# **Sand Fixing Mode of Tree-shrub Mixed Plantation for Mu Us Sand Land**

To plant shrubs and trees or tree-shrub mixed plantations in the low lands among dunes in Mu Us Sand Land shall be efficiently helpful in sand fixing. The main technical points for planting shrubs are listed as follows: sand willow cuttage is in belts; The cuttings shall be 50cm in length. For dunes with a height of less than 3 meters and forest planting conducted in spring, a distance of 6 to 7 meters is to be set aside and for forest planting conducted in winter a distance of 10 to 11 meters is OK, while for dunes with a height of 3 to 7 meters and forest planting conducted in spring, a distance of 3 to 4 meters is to be set aside and for forest planting conducted in winter a distance of 7 to 8 meters is OK. The major trees planted are xerophile willows and camphor trees with a distance of 2 meters between two trees and 3 meters between two lines. Tree-shrub mixed plantation shall better be of a tree-sandwillow mixed type.







## （九）毛乌素沙地流动沙地

### 沙障固沙模式

在流动沙地，设置沙障设置形式为行列式和网格状。网格式配置规格**4×4m**，局部沙丘用**2×2m**，平缓沙丘适当放大到**6×6m**。材料以秸杆、柴草为主。



# **Sand Fixing Mode of Barrier Bars for Regeneration**

## **Plants in Mu Us Migratory Sand Land**

Barrier bars are set for migratory sand lands in lines and rows or in grids. The latter type is favored in the distances of  $4 \times 4$  meters and  $2 \times 2$  meters is partly applied to plantation on the dunes. For mild dunes, the distances could be enlarged to be  $6 \times 6$  meters. The main materials are straw and grass.









## （十）呼化贝尔沙地樟子松封育治理模式

在呼伦贝尔沙地有樟子松母树分布的疏林地，采取架设围栏，全封的方法，使樟子松得以天然更新。封育区面积一般为**150**公顷以上，封育年限**10-15**年。在封育区内母树附近进行块状或带状整地，块状规格为**1m×1m**，带状整地宽**1-2m**，通过整地使种子与土壤充分接触，促进种子更新。封育区内的空旷地，进行人工补植，加快成林速度。





# Camphor Tree Planting and Closure Mode for Hulunbuir Sand Land

There are sections with sparse camphor trees in Hulunbuir Sand Land. And fences are established and complete closure is conducted so that the camphor trees are naturally renewed. The closure area is of a total size of 150 hectares and the enclosure time is of 10 to 15 years. Work of soil preparation in belts or blocks at grounds near the seed bearers is conducted. Soil preparation in belts shall be in the size of 1 to 2 meters and that in blocks shall be in the size of 1 × 1 meter. And ground preparation enables a close touch of the seeds with the soil and facilitates refreshing. On the vacant areas in the section, reforestation is necessary by manual work to speed the forming of a forest.








# 呼伦贝尔沙地樟子松封育






## 二、沙漠类型区主要治理模式


### Major Control Modes for Deserts




内蒙古分布有巴丹吉林、腾格里、乌兰布和、库布齐四大沙漠，在治理过程中，主要以保护自然生态系统、恢复绿洲为主。将目前不具备治理条件的区域划为封禁保护区，实行封禁保护。结合生态工程，对沙漠周边实施锁边防护林建设，遏止沙漠向外扩展。







There are four largest deserts lying in Inner Mongolia: Badain-jaran, Tengger, Ulan Buh and Hobq. In the process of controlling, our priority goes to protection of natural-ecological system and recovery of oasis. And areas whose controlling conditions are not met yet at the moment are closed reservations in complete closure. In combination with ecological projects, edge protective belt is set to stop the extension of desert.





腾格里沙漠



巴丹吉林沙漠



库布齐沙漠



乌兰布和沙漠



## （一）机械沙障固沙模式

在流动沙丘上，设置机械沙障，后在障间造林。机械沙障以平铺式为主，材料主要采用灌木和农作物秸秆等。沙障材料和沙障线大致垂直放置，然后沿沙障线将沙障材料从中部压入沙中**5-10cm**，沙障材料上部一般留**15-20cm**。我区沙障插设季节以秋末冬初为宜，障间距应为障高的**10**倍左右，沙障一般设置在沙丘迎风坡的中下部，行列式设置，走向与主风方向垂直。沙障设置完成后，根据当地的条件，选择适宜的树种，在障间进行人工造林。



## **Sand Fixing Mode of Mechanical Barrier Bars**

On the migratory dunes, mechanical barrier bars are established before plantation in the space within the bars. The mechanical barrier bars are mainly in a carvel type with local shrubs and crop straw as the major material. In establishment, the first step is to keep the barrier material meeting the barrier boundary line at right angles. Then push the barrier material into the sand to reach a depth of 5 to 10 cm with a length of 15 to 20cm above the ground level. And the best time for such establishment in Inner Mongolia is at the end of autumn and the beginning of winter. The distance between lines of barriers shall be ten times longer than the height of it. And the barrier bars are generally set at the middle or lower part of the windward slopes in lines and rows ant to meet the prevailing wind direction at right angles. Reforestation of suitable local tree types is to be performed in the space among the barriers.





# 库布齐沙漠机械沙障





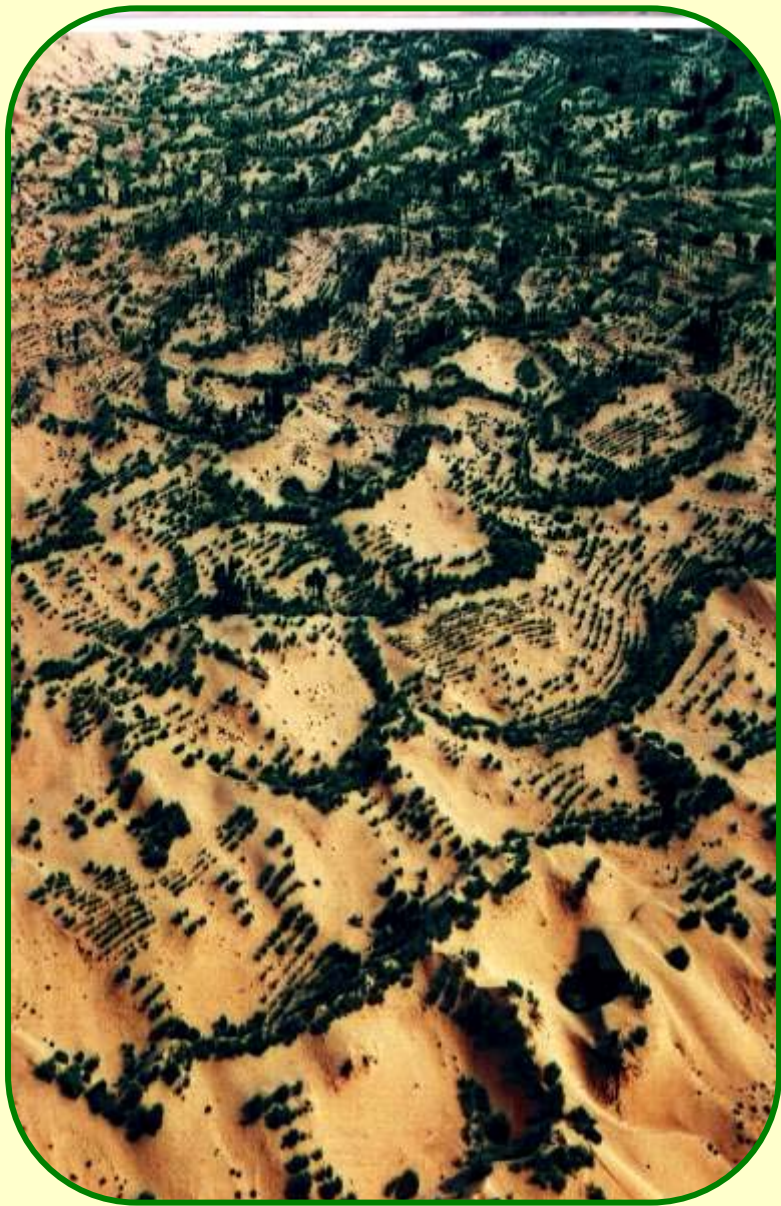
## （二）沙漠锁边林前挡后拉营造模式

在沙漠边缘的背风坡前方，用乔木造林，以挡住沙丘向前扩展，同时在沙丘的迎风坡下部，栽植灌木、半灌木，拉住流沙，然后利用风力削平未造林的沙丘上部，以此逐渐降低沙丘高度，沙丘上部的沙粒被阻挡在栽植乔木的丘间低地。乔木造林选用**2-3**年生苗木，造林在**6-7**月进行，造林密度**2×3m**或**3×3m**。



## **Protective Belt Plantation at Desert Edge**

Plantations are established in front of the leeward slopes at the edge of deserts so as to stop the further extension of the desert. Meanwhile, shrubs and subshrubs are to be planted at the lower parts of the windward slopes to fix sand. Then by making use of wind power, the bare top of the dunes are gradually flattened so that the height of dune falls. And the sand grains from the top of dunes are stopped at the low lands among the dunes by trees planted there. The trees to be planted shall be biennises and triennials and forestation is conducted in June and July in the density of  $2 \times 3$  meters or  $3 \times 3$  meters.



乌兰布和沙漠锁边林带





# 三、农牧交错类型区治理模式

Control Modes for Agro-pastoral Mixed Areas



## （一）“两行一行”林草复合经营模式

在农牧交错的沙地、平原、平缓山地，采取“两行一带”林草复合经营模式。一般的配置方式有两行灌木+草带，或两行乔木+草带，或两行乔木+草带+两行灌木，乔木带间距**8—10**米，灌木带间距**5—8**米。







## **Compound Control Mode of Forest-grass Mixture of**

### **“Two Lines Plus One Belt”**

This mode is applicable to agro-pastoral mixed sand lands, plains and mild mountainous areas. The general arrangement for the mode could be: two lines of shrubs plus a belt of grass, two lines of trees plus a belt of grass and two lines of trees plus one belt of grass plus two lines of shrubs with a distance of 8 to 10 meters between two lines of trees and that of 5 to 8 meters between two lines of shrubs.



“二行一带”乔草型防护林，配置方式：二行乔木，行距**2—4m**，株距**1.5—2m**，带间距**8—10m**。林带间种多年生豆科牧草或自然恢复草类。

“二行一带”带乔灌草型防护林，配置方式：二行乔木+草带+二行灌木。乔木二行，株距**2m**，行距**3m**，带间距**8—10m**；灌木二行，株距**1—1.5m**，行距**2m**，带间距**8—10m**。林带间种植多年生豆科牧草或自然恢复草类。

“二行一带”灌草型防风固沙林，配置方式：灌木二行，株距**1—1.5m**，行距**2m**，带间距**6-8m**。林带间种植多年生豆科牧草或自然恢复草类。

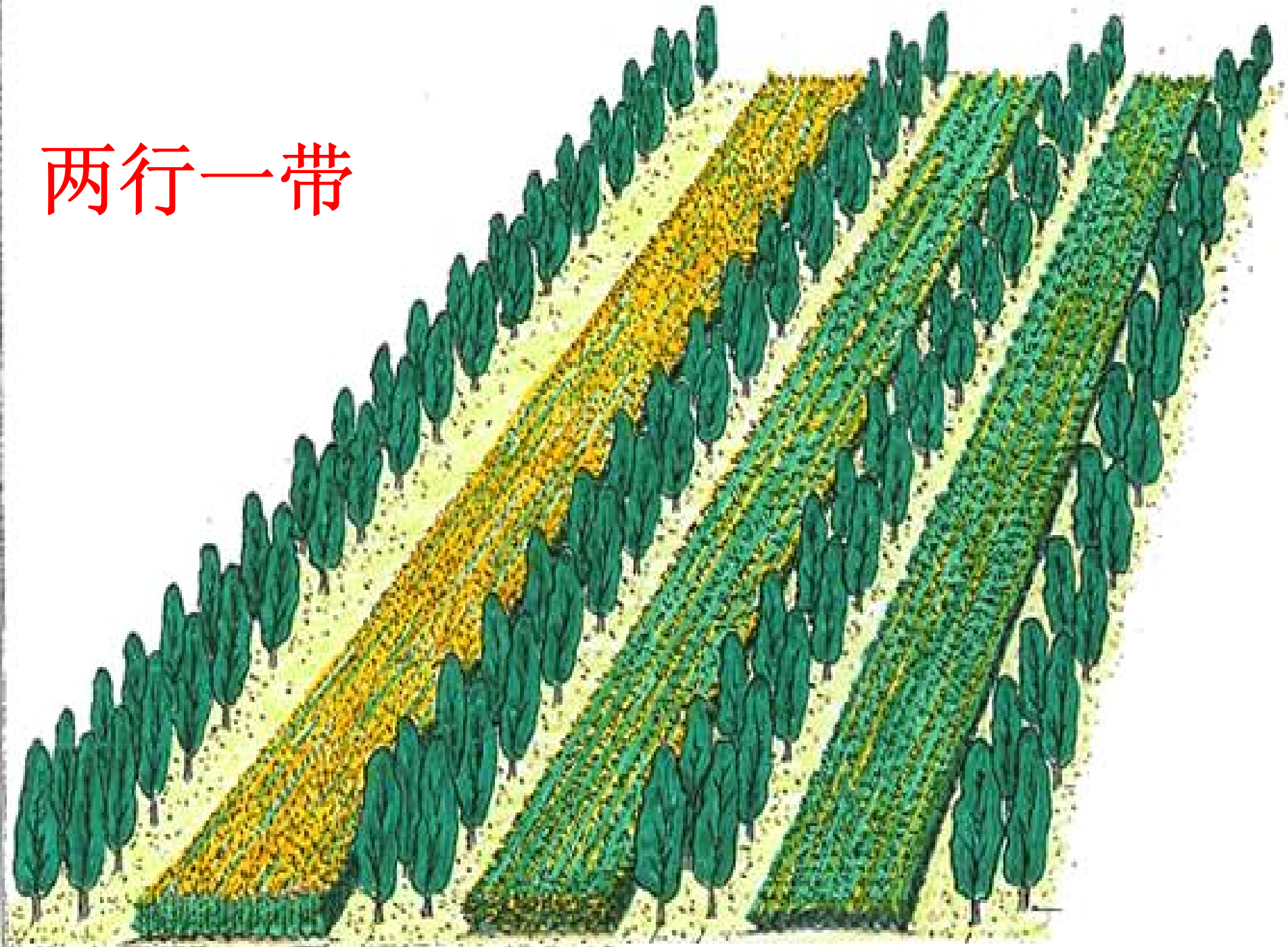




The tree-grass mixed protective forest is arranged as follows: two lines of trees in a distance of 2 to 4 meters between two lines and that of 1.5 to 2 meters between two trees and that of 8 to 10 meters between the belt and lines of trees. The space among the lines and belts are planted with perennial leguminous forage and grass of a natural refreshing type. The tree-grass-shrub mixed protective forest is arranged as follows: two lines of trees in a distance of 3 meters between lines and 2 meters between trees and 8 to 10 meters between the belt and lines of trees. Or there are two lines of shrubs in a distance of 1 to 1.5 meters between shrubs and 2 meters between lines and 8 to 10 meters between the belt and lines of trees. The space among the lines and belts are planted with perennial leguminous forage and grass of a natural refreshing type. The shrub-grass mixed protective forest is arranged as follows: two lines of shrubs at a distance of 1 to 1.5 meters between shrubs and that of 2 meters between lines and that of 8 to 10 meters between the grass belt and the lines of trees. The space among the lines and belts are planted with perennial leguminous forage and grass of a natural refreshing type.



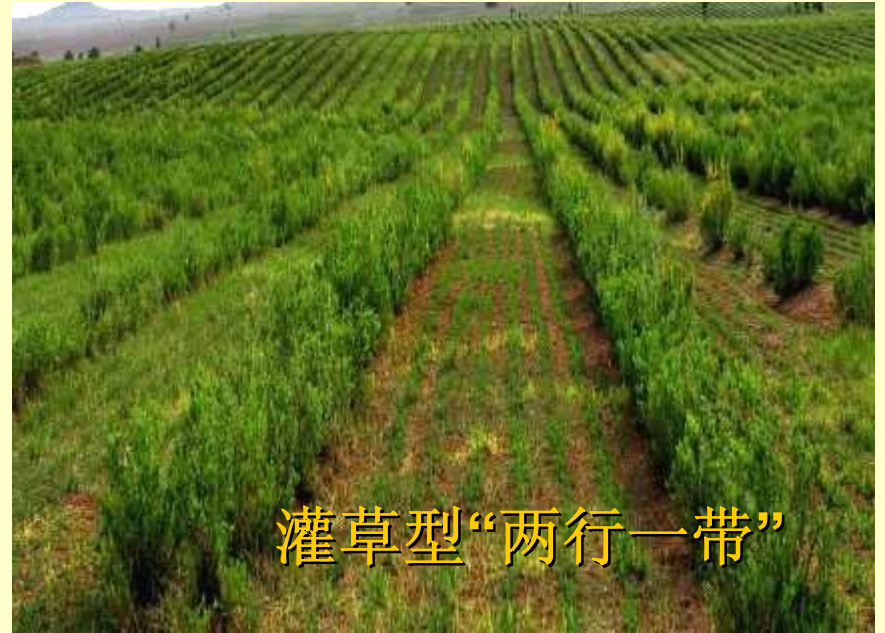
# 两行一带







乔草型“两行一带”



灌草型“两行一带”



乔木型“二行一带”



经济林草型“两行一带”







# 多伦县退耕还林万亩“两行一带”樟子松





# 乌兰察布市“两行一带”林草间作





## （二）机械开沟造林技术模式

在干旱、半干旱地区，平地或**15度**以下坡地，通过采用机械或人工开沟、选择壮苗、苗木保湿、深坑深埋、覆土栽植等抗旱造林措施，使苗木不失水和根系不受损伤。开沟深**35—50cm**，沟底宽**20—30cm**。一般在造林前一年雨季前开沟。再在沟内挖坑，坑穴一般为**40cm×40cm×40cm**。栽植时回填土深度要超过苗木根茎**7-15cm**。

## **Technical Mode of Mechanical Trenching Plantation**

In arid and semiarid regions, flat grounds and slopes of a grade lower than 15 degrees, mechanical or manual ditching is practiced, fine saplings are singled out and kept wet. Other draught-enduring measures are taken like deep ditching and deep burying and ball planting so that there is no water loss of the saoling and no damage of the roots. The ditches shall be in a depth of 35 to 50cm and a width at the bottom of 20 to 30cm. Work of ditching shall be done in rainy season one year before plantation. Then pits are to be dug in the ditches in the size of 40cm × 40cm × 40cm. and the depth of filling earth shall be 7 to 15cm above the root of the saplings.







# 克什克腾旗芝瑞镇高寒漫甸防护林网





# 其它主要技术

Other main techniques





# 沙地果园





大扁杏



杏



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在平原农区，以平原绿化和农田防护林建设为重点，发展了防护用材兼用林、工业原料林和经济林，建设、改造、提高相结合，建设带网片相结合的高效农业防护林体系。

In agricultural area, with plain greening and farmland shelterbelt construction as the key point, different forest types like that for protective and timber use, that for industrial raw material use and economic forest, forest construction have been developed. A high-efficient agriculture shelter-forest system in belts, nets and sheets has been established combining construction reconstruction and





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