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PATENTS ACT, 1978

## CERTIFICATE

In accordance with section 44 (1) of the Patents Act, No. 57 of 1978, it is hereby certified that:

**XINJIANG INSTITUTE OF ECOLOGY AND GEOGRAPHY;  
CHINESE ACADEMY OF SCIENCES**

Has been granted a patent in respect of an invention described and claimed in complete specification deposited at the Patent Office under the number

**2022/03494**

A copy of the complete specification is annexed, together with the relevant Form P2.

In testimony thereof, the seal of the Patent Office has been affixed at Pretoria with effect

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TITLE OF INVENTION

54 Construction Method of Artificial Vegetation of Camel Thorn in Oasis Periphery

## **Construction Method of Artificial Vegetation of Camel Thorn in Oasis Periphery**

### **TECHNICAL FIELD**

The invention relates to a vegetation construction method of a deep-rooted plant, camel thorn (*Alhagi sparsifolia* Shap.), under the condition of artificial promotion.

The popularization and application of this method will provide technical support for the artificial vegetation construction of camel thorn in arid areas. Therefore, it provides a technical approach for the construction of degraded camel thorn vegetation and the improvement of ecological environment in arid environment.

### **BACKGROUND**

The technology and method of vegetation construction in degraded ecosystem in arid area is the key and difficult scientific problem of restoration ecology. Due to the comprehensive influence of unsustainable water sources, wind and sand hazards and complex terrain, it is often difficult to restore degraded vegetation by pure natural methods in natural environment, especially in the southern margin of Tarim Basin where water resources are seriously scarce and wind and sand hazards are extremely serious. However, combined with the long-term ecological test site of Qira Desert Research Station, Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, through years of experimental research and positioning observation, it is found that it is feasible to construct the vegetation of the deep-rooted plant camel thorn by artificial promotion in the oasis-desert transition zone, and good ecological and economic benefits can be achieved. Rebuilding vegetation in oasis-desert transition zone by artificial technology can not only protect oasis ecological security,

but also promote the development of local animal husbandry. Therefore, it is very important to explore and establish artificial vegetation construction technology that can be widely used (especially suitable for vegetation construction in oasis-desert transition zone in arid areas).

camel thorn is a perennial herb with deep roots, which is widely distributed in arid areas of northwest China. The oasis-desert transition zone in the southern margin of Tarim Basin is distributed in a large area. camel thorn has the characteristics of strong adaptability, drought resistance and saline-alkali resistance. They are not only the main vegetation for wind and sand fixation, but also an important part of oasis protection system, an important ecological barrier for improving ecological environment and protecting agriculture and animal husbandry production. At the same time, camel thorn is an important plant resource, which occupies a certain position in animal husbandry production and plays an irreplaceable role by artificial measures. However, for a long time, because of unreasonable human use and livestock destruction, the camel thorn vegetation near the periphery of the oasis in the southern edge of Tarim Basin has been seriously damaged. Accelerating the restoration of the camel thorn vegetation can not only provide good feed and pasture, promote the development of animal husbandry, increase people's income, but also build a safety barrier for oasis farmland. This technical achievement will provide practical methods and technical approaches for the restoration of the camel thorn vegetation in the southern margin of Tarim Basin. Therefore, it has important application value.

The southern margin of Tarim Basin is the most severely damaged area by wind and sand in China, with extremely scarce precipitation, frequent wind and sand disasters and single vegetation types. Due to the fine particle size composition of sand, sand can be started at the wind speed of more than 4 m/s. The annual average weather of sandstorm, floating dust and sand blowing is more than 250 days. There are windy weather in spring and summer, with 3-9 times of gale above Grade 8 every year, with annual average precipitation of 35.1 mm, annual evaporation of 2,595.3 mm and dryness of 20.8. Under such extreme environmental conditions, the natural restoration of the camel thorn vegetation is extremely difficult. Therefore, it is an important issue worthy of attention to construct the artificial vegetation of the camel thorn through the method of moderate water control, and the exploration of the artificial construction technology and method of the camel thorn vegetation is the key content of this method.

## **SUMMARY**

The purpose of the invention is to provide a method for constructing the artificial vegetation of camel thorn in the periphery of oasis, which is completed by the steps of seed collection and storage, seed treatment, artificial planting, irrigation and management. After years of experimental research and field observation, the method has been used in the experimental demonstration of the artificial vegetation construction of camel thorn in the periphery of oasis in Qira arid area on the southern edge of Tarim Basin, and the average survival rate of the artificial vegetation of camel thorn built near the periphery of oasis has reached over 90%. The average survival

rate of the artificial vegetation built in the far periphery of the oasis is over 80%. The overall growth situation of artificial vegetation is stable, and it has played a normal role.

The invention relates to a method for constructing artificial vegetation of camel thorn in the periphery of oasis, which comprises the following steps:

a, in the late autumn and early winter, when the seeds of camel thorn are fully mature, collect the seeds that grow in the middle and upper parts of the plant, have full seeds and good maturity, naturally air-dry, remove impurities and seed coats, wrap the clean seeds with gauze, stand for 3-5 days, then pour them into a clean bottle, tighten the bottle cap, and put them in a refrigerator for cold storage at a low temperature of 4-5°C;

b, at the end of April or the beginning of May of the second year, soaking the stored seeds in clear water for 48 hours, and then planting them manually;

c, selecting a relatively flat area in the peripheral area (1) 1-2 km from the edge of the oasis, sowing by block hole sowing, excavating a small plot (3) of 10 m \* 10m, building a 50 cm-wide and 50 cm-high ridge around the small plot (3), digging hole (4) in the small plot (3)

d, selecting a section with small relief in the peripheral area (2) 3-5 km from the edge of the oasis, sowing by ditch hole sowing, digging a planting ditch (5) with a depth of 50 cm and a width of 50 cm, digging a hole (6) in the planting ditch (5), sowing the treated camel thorn seeds in the hole (6), and gently pressing the filled soil;

e, irrigate that small plot (3) sown in step c under flood condition, and timely remove weeds, especially harmful weeds, which appear aft irrigation;

f, irrigating the sowing ditch by flood conditions in the planting ditch (5) of step d, creating favorable environmental conditions for the early survival and growth of the camel thorn seedlings by using some kinds of weeds after irrigation, and gradually removing different kinds of weeds after the seedlings grow stably.

In step c, each hole (4) is spaced at a distance of 200 cm, and each hole (4) is seeded with 5 seeds with a seeding depth of 5 cm.

In step d, the distance between every two planting ditches (5) is 200 cm, the distance between each hole (6) is 100 cm, and five seeds are sown in each hole (6) with a sowing depth of 5 cm.

The invention relates to a method for constructing artificial vegetation of camel thorn in the periphery of oasis, which is characterized in that:

(1) seed collection time and storage method: the quality of seeds is the premise of artificial vegetation construction of camel thorn. During the period of complete maturity of camel thorn seeds in late autumn and early winter (through years of observation and research, it is found that camel thorn seeds have a post-ripening period, and after the early maturity at the end of August to the full maturity at the end of October, the seeds of camel thorn seeds are full, mature, good in quality and high in germination rate), and the seeds that grow in the middle and upper parts of the plants and are free from pests and diseases are collected. After a period of natural drying, removing impurities and seed coats, the clean seeds are wrapped in gauze and placed



indoors for 3-5 days, then poured into a clean plastic bottle, the bottle cap is tightened, and placed in a refrigerator for cold storage at 4-5°C (not frozen);

(2) seed treatment: seed treatment before sowing is the key to the artificial vegetation construction of camel thorn. In the early summer of the second year (the end of April or the beginning of May), the stored seeds are soaked in clear water for 48 hours, and then planted artificially, because this time period is a period when the atmospheric temperature and the soil temperature rise rapidly and can maintain a high temperature continuously, and flood irrigation can be used, that is, the hydrothermal period. In this case, camel thorn seeds germinate quickly. Through long-term experimental research and observation and analysis, it is shown that there are three reasonable ways to deal with the seeds of camel thorn: clean water treatment (soaking the seeds in clean water for 48 hours, which is characterized by being suitable for the treatment of large quantities of seeds with loose sowing time, neat seed germination and high survival rate of about 90%); Hot water treatment method (soaking seeds in hot water at 70°C for 12 hours, which is characterized by being suitable for the treatment of seeds with relatively tight sowing time, neat seed germination and high survival rate of about 80%); Sulphuric acid treatment (treating seeds with 98% sulfuric acid for 2 hours, which is characterized by being suitable for treating a small number of seeds with tight sowing time, but the seeds germinate relatively neatly and the survival rate is maintained at about 70%);

(3) artificial planting: sowing in different locations around the oasis with different sowing methods is the guarantee for the successful construction of the artificial

vegetation of *Alhagia arborescens*. In the vicinity of the oasis (1-2 km from the edge of the oasis, because the soil moisture condition in this area is relatively good, the flood can be relatively easy to reach, and the degree of damage caused by wind and sand is relatively low), the block hole sowing method is used for sowing, that is, a location with relatively flat terrain is selected in the vicinity of the oasis. Relatively evenly divide small plots of 10 m× 10 m, build ridges of 50 cm wide and 50 cm high on the four sides of the small plots to facilitate irrigation, dig holes in the small plots with a spacing of 200 cm between each hole, sow the treated Alhagi seeds in the holes, sow five seeds in each hole with a depth of 5 cm, and gently press the filled soil after sowing; In the outer periphery of the oasis (3-5 km from the edge of the oasis, because the soil moisture condition in this area is relatively poor, the flood is relatively difficult to reach, and the harm degree caused by the wind and sand is relatively great), the method of furrow hole sowing is used for sowing, that is, in the outer periphery of the oasis, select a section with relatively little relief, and relatively evenly cut out small furrows with a depth of 50 cm and a width of 50 cm. Two small ditches are 200 cm apart (which is convenient for effective use of flood water for irrigation), dig small holes in the ditches, each hole is 100 cm apart, sow the treated Alhagi seeds in the holes, sow five seeds in each hole with a depth of 5 cm, and gently press the soil after sowing;

(4) effective irrigation and management: different irrigation methods and other management measures in different areas around the oasis are the basis for the successful construction of the artificial vegetation of camel thorn: small block

irrigation is used in the areas near the periphery of the oasis, that is, the sown plots are irrigated by flood conditions immediately after sowing. The advantages of this small block irrigation method are short irrigation time, large soil water holding capacity, uniform water quantity and easy treatment. In this way, we can ensure the timely flood irrigation conditions in May, July and September of that year, and the survival rate and preservation rate of the artificial vegetation of camel thorn can be kept at about 90%. The coverage of the artificial vegetation of camel thorn in the first year after planting can reach 15-20% through root growth and root tillering. In terms of management, weeds, especially harmful weeds, that appear after irrigation must be removed in time to facilitate the survival and growth of camel thorn seedlings. Irrigation by furrow irrigation in the far periphery of oasis, that is, irrigation by flood immediately after sowing, has the advantages of saving water resources, large soil water holding capacity, uniform water quantity and easy treatment; In this way, the timely flood irrigation conditions in May and July of that year can be ensured, and the survival rate and preservation rate of the artificial vegetation of the camel thorn can be kept at about 80%. The coverage of the artificial vegetation of the camel thorn in the first year after planting can reach 10-15% through root growth and tillering. In terms of management, weeds that appear after irrigation, if they are not harmful weeds, can be removed in no hurry. Make use of some kinds of weeds to create favorable environmental conditions for the early survival and growth of camel thorn seedlings (keep a certain moisture condition and defend against a certain degree of sandstorm

hazards), and gradually remove different kinds of weeds after the seedlings grow stably.

### **BRIEF DESCRIPTION OF THE FIGURES**

Fig. 1 is a structural diagram of the present invention.

### **DESCRIPTION OF THE INVENTION**

#### **Embodiment**

The invention has been implemented in the experimental demonstration of the artificial vegetation construction of camel thorn in the periphery of Qira Oasis in the southern margin of Tarim Basin, and the specific operation is carried out according to the following steps:

a, in the late autumn and early winter, when the seeds of camel thorn are fully mature, collect the seeds that grow in the middle and upper parts of the plant, have full grains and good maturity (from the early maturity at the end of August to the full maturity at the end of October, the seeds of camel thorn are full grains, good maturity, good quality and high germination rate), naturally air-dry, remove impurities and seed coats, wrap the clean seeds with gauze, stand for 3-5 days, and then pour them into clean bottles.

b, In the second year (early summer), at the end of April or the beginning of May, the stored seeds are soaked in clear water for 48 hours, and then planted artificially. This time period is a period in which the atmospheric temperature and the soil temperature both rise rapidly and can maintain a high temperature continuously, and flood

irrigation can be used, so that the seeds of camel thorn germinate quickly and the seedlings grow well;

c, select a relatively flat area in the peripheral area 1 of 1-2 km at the edge of oasis, where the soil moisture condition is relatively good, and the flood can be relatively easily reached, and the harm degree caused by wind and sand is relatively low. Sow by block hole sowing, excavate a small plot 3 of 10 m × 10m, and build a ridge of 50cm wide and 50cm high around the small plot 3 (for irrigation), and in the small plot. The spacing of each hole 4 is 200 cm, and the treated seeds of Alhagi are sown in the holes 4, and each hole 4 is sown with 5 seeds, with a sowing depth of 5 cm, and the filled soil is lightly pressed;

d, select a section with small relief in the peripheral area 2 of 3-5 km at the edge of the oasis, the soil moisture condition in this area is relatively poor, the flood is relatively difficult to reach, and the degree of damage caused by wind and sand is relatively great. Sowing is carried out in the form of furrow hole sowing, planting ditches 5 with a depth of 50cm and a width of 50 cm are excavated, and the spacing between every two planting ditches 5 is 200 mm (to facilitate effective use of flood for irrigation), and holes 6 are dug in the planting ditches 5. The spacing of each hole 6 is 100 cm, and the treated seeds of Alhagi are sown in the holes 6, and each hole 6 is sown with 5 seeds, the sowing depth is 5 cm, and the filled soil is lightly pressed;

e, irrigate that small plot 3 sown in step c with flood conditions, which is short in irrigation time, large in soil water holding capacity, uniform in water quantity and easy to handle. by adopting this method, the timely flood irrigation conditions in May,

July and September of that year are guaranteed, and the survival rate and preservation rate of the artificial vegetation of the camel thorn can be kept at about 90%, and the coverage of the artificial vegetation of the camel thorn in the first year after planting can reach 15-20 through root growth and tillering.

f, irrigating the sowing ditch in the planting ditch 5 in step d by flood conditions, which can save water resources, have large soil water capacity, uniform water quantity and be easy to handle. By adopting this method, the timely flood irrigation conditions in May and July of that year can be guaranteed, and the survival rate and preservation rate of the artificial vegetation of the camel thorn can be kept at about 80%. The artificial vegetation of the camel thorn in the first year after planting can reach 10-15 coverage through root growth and tillering. For the weeds that appear after irrigation, if they are not harmful weeds, it is not necessary to rush to remove the weeds, and some kinds of weeds can be used to create favorable environmental conditions for the early survival and growth of camel thorn seedlings (keep certain moisture conditions and defend against wind and sand hazards to a certain extent). After the seedlings grow stably, different types of weeds can be gradually removed.

Based on long-term experiments and demonstrations, combined with the environmental characteristics of different areas around the oasis in arid areas, the invention provides an artificial vegetation construction method of the deep-rooted plant camel thorn in the oasis in arid areas, and provides a water management technology of the deep-rooted plant camel thorn artificial vegetation around the oasis in arid areas according to the growth characteristics of the deep-rooted plant camel

thorn. After years of experimental research and field observation, this method has been applied in Qira Oasis in the southern edge of Tarim Basin. In the experimental demonstration of the artificial vegetation construction of the camel thorn in the oasis in arid areas, by using this method, The average survival rate of the artificial vegetation built in the far periphery of the oasis is over 80%, and the overall growth of the artificial vegetation is stable. It is planned to extend this technology to other areas with similar conditions.

## THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS

1. A construction method of artificial vegetation of camel thorn (*Alhagi sparsifolia* Shap.) in the periphery of oasis, which is characterized by comprising the following steps:

a, in the late autumn and early winter, when the seeds of camel thorn are fully mature, collect the seeds that grow in the middle and upper parts of the plant, have full seeds and good maturity, naturally air-dry, remove impurities and seed coats, wrap the clean seeds with gauze, stand for 3-5 days, then pour them into a clean bottle, tighten the bottle cap, and put them in a refrigerator for cold storage at a low temperature of 4-5°C;

b, at the end of April or the beginning of May of the second year, soaking the stored seeds in clear water for 48 hours, and then planting them manually;

c, selecting a relatively flat area in the peripheral area (1) 1-2 km from the edge of the oasis, sowing by block hole sowing, excavating a small plot (3) of 10 m × 10 m, building a 50 cm-wide and 50 cm-high ridge around the small plot (3), digging holes (4) in the small plot (3)

d, selecting a section with small relief in the peripheral area (2) 3-5 km from the edge of the oasis, sowing by ditch hole sowing, digging a planting ditch (5) with a depth of 50 cm and a width of 50 cm, digging holes (6) in the planting ditch (5), sowing the processed camel thorn seeds in the holes (6), and gently pressing the filled soil;

e, irrigate that small plot (3) sown in step c under flood condition, and timely remove harmful weeds after irrigation;



f, irrigating the sowing ditch by flood conditions in the planting ditch (5) of step d; if the weeds that appear after irrigation are not harmful weeds, there is no need to rush to remove the weeds; some kinds of weeds are used to create favorable environmental conditions for the early survival and growth of the camel thorn seedlings, and then different types of weeds are gradually removed after the seedlings grow stably.

2. The method according to claim 1, characterized in that in step c, each hole (4) is spaced at a distance of 200 cm, and each hole (4) is seeded with 5 seeds with a seeding depth of 5 cm.

3. The method according to claim 1, characterized in that in step d, the distance between every two planting ditches (5) is 200 cm, the distance between each hole (6) is 100 cm, and five seeds are sown in each hole (6) with a sowing depth of 5 cm.



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FIGURES

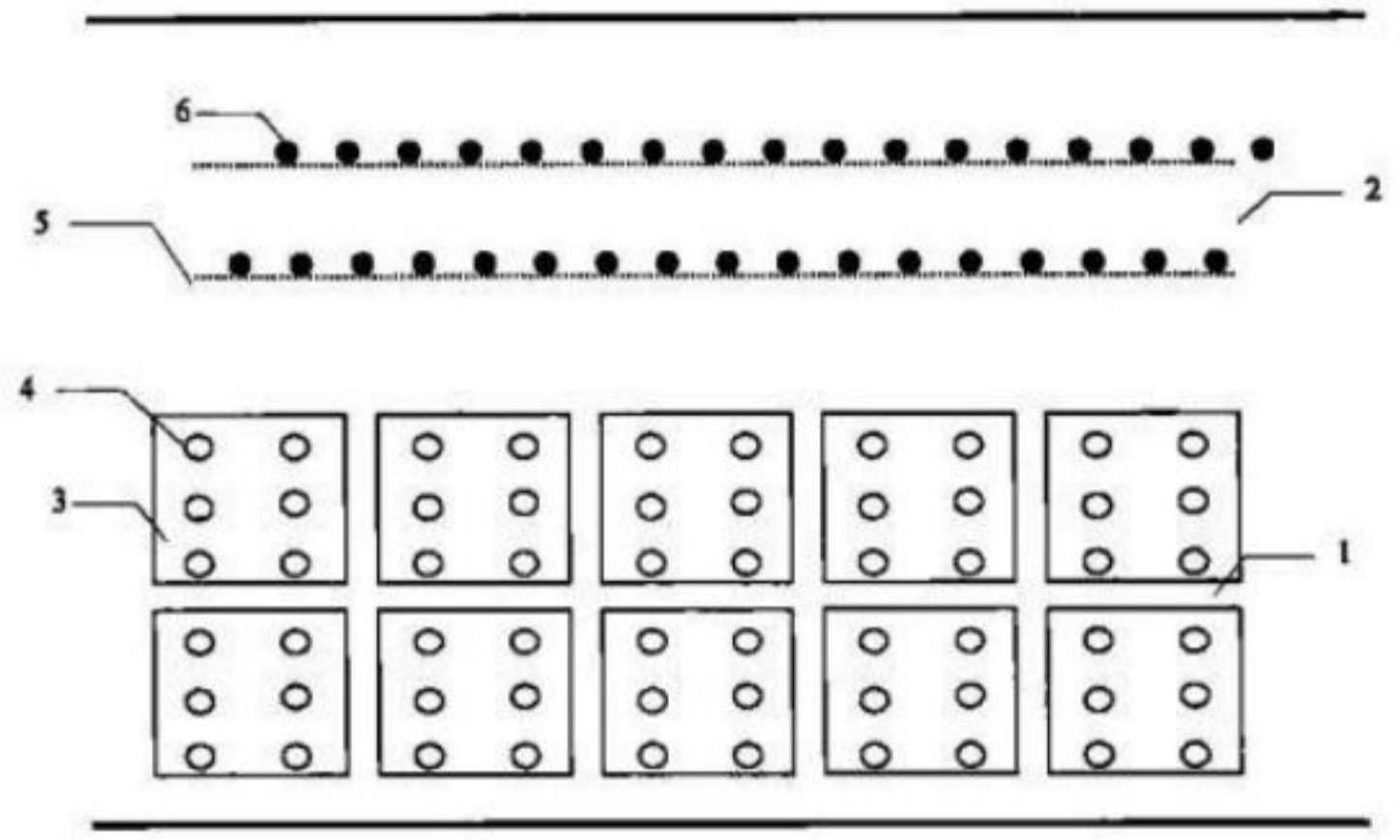


Figure 1

## **ABSTRACT**

The invention relates to a method for constructing the artificial vegetation of the camel thorn in the periphery of the oasis, which is completed by the steps of seed collection and storage, seed treatment, artificial planting, irrigation and management. After years of experimental research and field observation, the method has been used in the experimental demonstration of the artificial vegetation construction of the camel thorn in the periphery of the oasis in the Qira arid area on the southern edge of the Tarim Basin. The average survival rate of the artificial vegetation of the camel thorn near the periphery of the oasis reaches over 90%, and that of the artificial vegetation of the camel thorn in the far periphery of the oasis reaches 80%. The overall growth of the artificial vegetation is stable and is now functioning properly.