DEC. 1948

CLASSIFICATION CONFIDENTIAL CONFIDENTIAL

CENTRAL INTELLIGENCE AGENCY
INFORMATION FROM
FOREIGN DOCUMENTS OR RADIO BROADCASTS

REPORT

CD NO.

50X1-HUM

COUNTRY USSR

SUBJECT Economic; Scientific - Afforestation

HOW PUBLISHED Bimonthly periodical

WHERE PUBLISHED Moscow

DATE PUBLISHED Sep/Oct 1949

LANGUAGE Russian

DATE OF INFORMATION 1949

DATE DIST. 7 Aug 1950

NO. OF PAGES 8

SUPPLEMENT TO REPORT NO.

SOURCE Agrobiologiya, No 5, 1949.

USSR FIELD SHELTER BELT PLANTING BY THE NEST METHOD

T. D. Lysenko

In accordance with the Party and State decree of 20 October 1948, scientific research institutes and forest managements are perfecting the nest method for planting field shelter belts. The All-Union Academy of Agricultural Sciences imeni V. I. Lenin has been entrusted with working out methodological procedures in the application of the nest method.

The main obstacle to be overcome during the first growing years of tree plantings in the steppe zones is not lack of moisture or drought, but the wild steppe vegetation, above all such varieties as couch grass (Agropyron repens) and sedge (Carex caespitosa), etc.

To reduce the amount of labor and materials required for keeping planted areas clear of weedy steppe vegetation, it is necessary to sow or plant rapidly growing shade trees and shrubs. The crowns of such species will interlock after 4-5 years of growth and weeds will not be able to grow under these trees.

Experience has shown, however, that certain species of trees and shrubs which grow rapidly during their early years in the steppes of the European USSR cannot long withstand steppe climatic conditions when standing alone, and are very short-lived. But, shade trees and shrubs do endure well in the steppe zones when growing under a canopy of such long-lived species as oak, pine, and several others. Hence, it is expedient to plant long-lived species, mainly oak, in the steppes and pine on the sands, in conjunction with rapidly growing species of trees and shrubs.

Although rapidly growing species, from the fourth or fifth year after planting, do discourage the growth of wild steppe grass and thus protect the more slowly growing species of tree from the grass, at the same time they also hinder the growth of the slower growing species. As a result, the long-lived species as well as the steppe grass are killed off.

CLASSIFICATION CONFIDENTIAL

STATE	X	NAVY	X	NSRB
ARMY	X	AIR	X	FBI

DISTRIBUTION

According to the method used up to this time in steppe afforestation work, seedlings of one species are planted alternately with seedlings of other species. During the first years of life of these seedlings, frequent soil cultivation is necessary to eradicate wild steppe vegetation. After the crown of the rapidly growing species become interlocked, the resultant shade keeps the grass down but at the same time retards the growth of species such as oak, which grow more slowly and require light. Furthermore, considerable manual labor is required to expose the oak trees to the light.

Experience over a long period of time has shown that this process of exposing oak trees to the light, which they require, is so laborious that it frequently cannot be done in time to save the trees. On the other hand, steppe seedlings set out without a canopy of oak or pine begin to die out before they are 20 years old. Shade trees and shrub species are in good condition at the present time only in those old plantings where a canopy of oak, pine, or other long-lived species was formed.

Plantings with canopies must be set up in those zones affected by the decree of 20 October 1948. Since the old method used thus far for such plantings consumed too much time, biological and agricultural scientists were called upon to devise a method which would create the most favorable growing conditions possible with the expenditure of a minimum amount of work and materials. The nest method of shelter belt planting met these requirements.

Beginning in the spring of 1950, all shelter belt work is to be carried out according to the nest method, which includes nest planting of long-lived and rapidly growing tree seeds and row sowing of shrub seeds. Oak is to be used in all new shelter belt plantings where the soil is favorable to its growth.

Planting the seeds of such long-lived species as oak and pine in nests (or mounds) is a means of protecting the young trees from the encroachments of both steppe vegetation and the other more rapidly growing species of trees and shrubs. Seeds of rapidly growing species are similarly planted in nests, while shrub seeds are sown in rows. The shelter belts thus planted according to the nest method are further protected against encroachments of steppe couch grass and sedge by the sowing of annual agricultural crops or perennial grasses along both their sides. Experience has already shown that these grain crops and perennial grasses do not in any way hinder the growth of the trees and shrubs.

In the spring of 1949, acorns were planted according to the nest method on more than 2,000 hectares throughout the country. The largest single nest method planting of 155 hectares was carried out at the All-Union Selection and Genetics Institute near Odessa. Eighty hectares were planted on the fields of the Institute for Hybridization and Acclimatization of Animals at Askaniya-Nova in Kherson Oblast. Plantings at other research institutes and on the fields of some sovkhozes varied between 5 and 40 hectares, while they ranged from 0.5 to 5 hectares on the fields of several kolkhozes. Good results were obtained at all places. In most cases, 15 to 30 oak seedlings began to grow in each nest.

At the Selection and Genetics Institute, the main planting was carried out on a belt 50 meters wide, 22 kilometers long, comprising 110 hectares, and running along the sides of fields devoted to seed growing. Ten rows of nests were planted with acorns in this belt. Other areas of 30 hectares and 15 hectares, the latter forming a part of the institute's system of field shelter belts, were also planted according to the nest method. Secondary tree seeds will be planted and shrub seeds sown on all three areas in the fall. Secondary trees will be maple (Acer) and fruit trees.

The field shelter belts planted with acorns run along the sides of fields in various stages of the crop-rotation system. No special soil preparation work was required for acorn planting since the soil of each field had been prepared for the crop which was to be grown on it. Consequently, many different varieties of agricultural crops served as nurse crops to the seedling oak trees. These included winter wheat, oats, barley, sunflowers, flax, potatoes, and winter alfalfa. Some fields were also lying fallow during 1949.

During the 11 months from June 1948 to May 1949, the total precipitation which fell on the fields of the institute amounted to only 146 millimeters as compared to an annual average of 323 millimeters for this period. Heavier rains fell only after June 1949. In spite of these abnormally dry conditions prevailing until June, the acorns sprouted well and the plants developed roots 70 centimeters in length by 23 June.

In the author's article "Experimental Plantings of Shelter Belts by the Nest Method," published in January 1949, it was recommended that the strips of grain or other nurse crops on the shelter belt area be 4 meters wide, leaving one-meter-wide strips between them for the planting of acorns. These meter-wide strips would, of course, have to be weeded during the summer. The total area per hectare of shelter belt to be weeded would aggregate 1,500 square meters.

On the fields of the institute, the meter-wide bare strips were reduced in width, and nurse crops were planted right up to the acorn-planted nests. The acorns sprouted and began to grow just as well under these conditions as under those where the nurse crop was further removed. On the basis of this experience, it is now recommended that the latter method be followed during the first 2 years of the shelter belt's existence, with reversion to the former method beginning with the third year.

The nest method of planting shelter belts has the following advantages:

1. The nest method creates ideal growing conditions for primary tree seedlings in the dry steppe zones. The nurse crops give them the shade which they require for the first 2 years, prevent wild steppe vegetation from encroaching upon them, and protect them from strong, dry winds. Under these conditions, the young oaks grow as well as in the best nurseries. In fact, nest-planted oaks will be better developed, taller, and thicker in diameter after 5-10 years than would nursery-grown oaks, 1-3 years old, when transplanted to the shelter belts at the same age.

2. Shelter belt planting by the nest method requires the expenditure of less labor and material than the planting method hitherto used in forestry work. Manual planting of acorns in nests requires about 3 man-days per hectare of shelter belt. Planting of maple and other secondary tree species requires 1-2 man-days per hectare. Sowing of shrub seeds requires hardly any additional labor since it is carried out simultaneously with the sowing of rye, the nurse crop sown when shrubs are put in. Thus, the total labor required for planting one hectare of shelter belt by the nest method is 4-5 man-days. If special planting machines are used, the labor required is still less. Scarcely any labor is needed for weeding and other maintenance work on the shelter belt.

3. The land on which the shelter belt has been planted can still be used for growing agricultural crops during the early years of the belt's existence. The arrangement of the nests is such that agricultural power machinery can be used for sowing and harvesting the crops.

Another important advantage of the nest method in combination with the use of the land for agricultural purposes during the first 4 years of the shelter belt's existence is that it permits the accumulation of moisture in the soil. Moisture accumulation is important in the steppe zones for the trees, especially oak, to develop deeply penetrating root systems, so that they will not begin to dry up and die off during the second and third decades of their lives.

Moisture accumulation in the soil will be increased by the large amounts of snow which collect in the shelter belts during the winter. If not too many trees are concentrated on a given area, much of the water resulting from the melting of snow will soak deep into the soil. The roots of shrubs and agricultural crops lie nearer to the surface and will not consume much of the moisture which has penetrated to lower levels.

When planted according to the nest method, trees are comparatively few in number and at the same time evenly distributed over an area. Trees planted in this manner will draw less moisture from the lower soil levels than trees planted in rows 1.5 meters apart and spaced 0.6 meter from each other in the row.

The advantages of the nest method cited above will enable every kolkhoz and sovkhoz to exceed its shelter belt planting plan in the spring of 1950. For that reason, the procurement of as large a quantity of tree seeds, especially acorns, as possible is a primary task of the kolkhozes and sovkhozes. The quantity of acorns available will determine the extent to which the shelter belt planting plan is met and exceeded.

Types of fields on which spring planting of shelter belts is planned include: fields plowed during the fall for the planting of spring grains, other agricultural crops, or perennial grasses; fields lying fallow on which winter grains are to be planted; fields planted with winter grains and perennial grasses. Highest priority belts are those to be planted along the sides of cultivated fields on kolkhozes or sovkhozes where the whole area is under the plow, and those to be planted along the sides of arable fields where all land is not at present under the plow.

The width and composition (long-lived or rapidly growing species and shrubs to be planted) of field shelter belts must be determined from the decree of 20 October 1948 regarding shelter belt planting. Oak is to be planted on all soils where it will grow.

In the description of shelter belt planting which follows it is assumed that oak is the long-lived species being planted.

The area on which a shelter belt is to be planted is marked off so that nest rows, running along the sides of a field, will be 5 meters apart. Perpendiculars 3 meters apart are drawn across the rows with the result that there will be 667 points per hectare where the perpendiculars intersect the rows. At and around each of the intersection points, 30-35 germinated acorns are planted. About one centner of germinated acorns is required to plant a hectare of shelter belt in this manner.

Acorn planting should be done only in spring. Fall planting is not recommended because of danger to the seeds from frost and field rodents.

It is very important that the acorns planted in spring sprout before being planted, since they will then take root and begin to grow much faster. When unsprouted acorns are planted in steppe zones, it is possible that the upper soil layers will dry out before the young roots have had an opportunity to fasten themselves into the soil. Acorns which sprout very late

will not be able to develop root systems capable of withstanding dry winds and high temperatrues. Early sprouting acorns, on the other hand, will have driven their roots a meter deep into the soil by the time July and August heat and drought arrive.

It is significant that on the same field where late sprouting oak seedlings did not survive, early sprouting plants not only lived but showed no signs of suffering from drought. Therefore, emphasis must be laid on early spring planting and early sprouting of acorns.

To effect preplanting sprouting of acorns, special attention must be paid to their storage during winter. The best way to store them is in trenches one meter wide and one meter deep. Immediately after they have been collected in the fall, they should be placed in the trench in successive one to two-acorn thick layers and each layer should be covered with 1 to 2 centimeters of soil of normal moisture. The upper 20 centimeters of the trench should be filled in with soil only. To prevent fall rains from soaking into the trench, a mound of earth is heaped above it. The height of the mound over and around the trench is increased with the first frosts to prevent freezing of the acorns in the trench.

During winter, and especially 1 to 1½ months before spring planting, the acorns in the trench must be examined. The acorns will usually develop sprouts during winter when stored by this method. But if less than 10 percent of the acorns have germinated a month before spring planting, they must be removed from the trench together with the soil and must spread out 15-20 centimeters deep in a building heated to 7-12 degrees. In this building, germination must be forced so that the acorns can be planted in a sprouted condition when spring planting time comes. The soil must be kept moist enough to encourage germination.

In early spring, the belt to be planted is marked off as already described. During this period, the acorns are dug from the trenches or brought from the forced germination buildings and hauled to the field. There they are deposited in heaps 100 meters apart, each heap containing enough acorns to plant 100 meters of belt. The acorns must be kept in a moist condition at all times, and for that reason are to be taken to the field in wet sacks.

After the acorns have been deposited in heaps on the field, a quantity of mycorhizal earth, obtained from under oak plantings or from nurseries where oak seedlings are grown and equal to about half the volume of the acorns, is poured over them. The acorns must be kept covered with earth so that they do not dry out.

Planting is carried out as follows: the planters place a quantity of acorns and mycorhizal earth into a pail and walk along the previously marked off lines. At each point where a perpendicular line intersects a row line, the planter digs a hole with a hoe, places six or seven acorns into it, adds a small quantity of mycorhizal earth, covers the acorns with a 4 to 6-centimeter layer of soil, presses down the soil with his foot, and covers the planted spot with a 1 to 2-centimeter layer of pulverized soil. The planting depth for acorns should be from 5 to 7 centimeters. Along the circumference of a circle with a radius of 30 centimeters from the first hole, the planter makes four more holes and repeats the original procedure. The completed nest then consists of five holes each planted with from six to seven acorns for a total of 30 to 35 acorns planted in each nest.

After the acorns have been planted (or before their planting, in some cases) the entire field, including the shelter belt area, is sown with the agricultural seed called for by the rotation system. Planting of the agricultural crop need not necessarily wait for completion of acorn planting.

Often shelter belt areas must be laid out and acorns planted on fields on which winter grains have been sown during the preceding fall or on which perennial grasses are growing. In such cases, circular areas with diameters of 50-60 centimeters are cleared off with a hoe and planting is carried out as described above. Conversely, if acorns have already been planted on clear or fallow-lying fields, or if soil preparation work must be carried out on fields to be planted after acorn planting has been completed, the areas lying between nest rows (each about 4 meters wide) must be prepared as are the fields.

After the agricultural crop has been harvested, it is necessary to disk or shallow plow (15-17 centimeters) and then to harrow the 4-meter-wide areas between nest rows, leaving untouched the one-meter-wide strips on which the nests are located.

When fall sowing time comes, rye is sown on the entire shelter belt area, including the meter-wide strip occupied by the nests. Sowing on the 4-meter-wide areas is done with a 24-row disk drill.

Of the 24 feed tubes on the drill, three tubes--the sixth, twelfth, and nineteenth--must not sow rye, but shrub seeds. In most cases, the shrub seed will be Siberian acacia (Caragana arborescens) mixed with other species, but the choice of shrub seed will depend on soil, climatic, and economic conditions. The outer rows of shrubs will then be 152.5 centimeters from the center of the strip on which the oak seedlings are growing and the distances between rows of shrubs will be 90 and 105 centimeters.

Partitions are installed in the seed box of the drill so as to segregate the portions serving the sixth, twelfth, and nineteenth feed tubes. To control the shrub-seed-sowing rate, appropriate amounts of rye are added to the shrub seeds.

The meter-wide strips occupied by oak seedlings are sown with a horse-drawn ten-row drill. Sowing must be carried out directly up to the nests. After this has been done, the entire shelter belt area will have been solidly sown with rye, with three rows of shrubs sown into the rye.

Larger shrub seeds, hazelnut (Corylus avellana) for example, which cannot be sown in the manner described, must be planted with a hoe. They are to be planted in the same rows as the previously sown shrub seeds, in holes made with a hoe 1.5-2 meters apart; 5-10 seeds are to be planted in each hole.

Also, before the first fall frost, secondary tree seeds must be planted between the nests of oak seedlings in the direction of the nest rows. The species chosen depends on conditions prevailing in the given region. The choice may include various maples (Acer), birch (Betual), linden (Tilia), ash (Fraxinus), various elms (Ulmaceae), wild pear (Pyrus communis), apple (Pyrus malus), apricot (Pyrus armeniaca), and many others which will thrive under a canopy of oak.

Seeds of rapidly growing trees planted in one hole should not be mixed but should be of the same species. The best method of all is to plant one species in one row and another species in another row. Fruit trees as well as rapidly growing species should be planted.

CONFIDENTIAL

The planting of rapidly growing tree seeds, which must be done in the fall, proceeds as follows: a hole is made with a hoe midway between two oak nests, 20-30 seeds are dropped into the hole, and if the species happens to be ample, the seeds are covered with 4 to 5 centimeters of soil. The planting depth varies slightly with different species.

By the following spring, typical shelter belt might present the following appearance:

1. The centers of nests occupied by young oaks entering the second year of their life will be 5 meters distant from the centers of the two neighboring nests in the nest row direction, 3 meters in the perpendicular direction.

2. In the 4-meter-wide corridor between nest rows, there will be three rows of sprouting Siberian acacia mixed with other shrubs; the intervals between the three rows will be 90 and 105 centimeters; the outermost rows of shrubs will be 152.5 centimeters distant from the center of the oak nest rows.

3. Secondary tree seeds, maple or some other species, will be sprouting in the smaller nests located in the oak nest rows midway between oak nests.

4. The entire shelter belt will be protected by its rye nurse crop.

When the rye has ripened, it must be cut as far from the ground as possible in order to leave a high stubble for holding snow on the young shelter belt.

When fall sowing time comes, rye is again sown but without presowing soil preparation. At that time and subsequently, rye is only sown in the 4-meter-wide corridor then occupied by shrubs. The wheel-to-wheel width of the 24-row tractor drill is 4.1 meters. Therefore, the corridors are sown by one sweep of the drill.

The strips occupied by the 2-year-old oaks and one-year-old maples or other supplementary tree species are not sown with rye since shade from above no longer benefits oaks after the beginning of the third year of their life.

When the Siberian acacia or other shrubs are 2 years old, their tops will be cut off when the rye is harvested. This cutting will serve a useful purpose since Siberian acacia, for example, will then branch out much better.

In fall, with the Siberian acacia not quite 2 years old and the oaks 3 years old, rye is sown once more as it was the year before. When it is harvested, the shrubs will be cut off again, but once more for the best interests of their future development.

At this harvest time, the oaks will already be 4 years old, the secondary trees and shrubs 3 years old. Hereafter, the shelter belt will be on its own.

By the time it is 4 years old and twice cut back, Siberian acacia will have covered the entire area around it and steppe vegetation will no longer be able to encroach on it. The oaks and other trees will also be shading the soil by this time.

CONFIDENTIAL

CONFIDENTIAL

Forest trees suffer from steppe grass as they do from fire. Such steppe grasses as couch grass (Agropyron repens), sedge (Carex caespitosa), and Bermuda grass (Cynodon dactylon) grow under various climatic conditions and in various regions; in steppe formation they play one and the same role: they are the front-line fighters in the struggle of the steppe against the forest. The forest's front-line fighters in the war against the steppe are those species which kill steppe grass with their shade.

The nest method of planting shelter belts are described above gives the young forest vegetation the protection it requires from steppe vegetation. Once having attained some degree of maturity, the forest will be able to hold its own against its steppe plant enemies.

In the line with the struggle for survival taking place in nature, it is necessary to select species of trees which will quickly be able to stand up against their steppe plant enemies. At the same time, it is necessary to choose species which will live for a long time in the steppe. Since they fulfill these prerequisites, oak, pine (on sands), and several others are recommended as long-lived species, maple and others as rapidly growing species, and Siberian acacia and other shrubs as undergrowth. Since oak at first grows slowly, it must be planted a year in advance of rapidly growing species and shrubs.

Practicing foresters should not raise objections to the nest-planting method since in natural mixed forests oaks are always found in nests during the early years of their life, and the individual oak trees are always protected in the forest by other tree species. The fear that 20-30 young oaks are too many for the area occupied by one nest is unfounded. Since the object is not to raise all the seedlings but to establish a shelter belt, it will be sufficient if only two or three seedlings of each nest survive and finally emerge as trees that will live 30-50 years. At this survival rate, there will be more than a thousand oaks, as well as about an equal number of rapidly growing trees such as maple, on each hectare of shelter belt.

- E N D -