QUAIL AS AN ADDITIONAL FARM CROP ON THE AVERAGE FARM IN MONTGOMERY COUNTY

(Thesis One)

by

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III

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INTRODUCTION

The Virginia Cooperative Wild Life Research Station, a division of the Biology Department of the Virginia Polytechnic Institute, is an organization sponsored by the United States Department of Agriculture Biological Survey, the American Wildlife Institute, the Virginia Commission of Game and Inland Fisheries, and the Virginia Polytechnic Institute for the purpose of research and experimental work in increasing game birds and animals. One of the problems taken up is to determine whether or not the quail, or partridge (Colinus virginianus virginianus), as the bird is often called in Virginia, can be increased economically enough to be considered an additional crop on the average farm of Montgomery county of Virginia. The complete study will require a number of years; hence this thesis is in the form of a progress report.

Montgomery county is located in the Southwestern part of Virginia, and is primarily a cattle county. There is some general farming in the county, but after the crops are removed from the land then the cattle are turned in to the fields to clean up the wasted, or unharvested grains. The cattle destroy practically all of the cover that the quail could use. Then too, the first plants that the cattle seem to remove from the pastures are the wild legumes, and the legumes are considered to be the most important sources of feed for the quail, and the population decreases on that area.

Heretofore the game management practices that have been used have been more or less a hit or miss system in Virginia, and often the results were very unsatisfactory. This long time "Quail Demonstration" is intended to test the effectiveness of certain definite quail management practices.

REVIEW OF LITERATURE

Aldo Leopold[1] says "We are accustomed to thinking of all game as unbelievably abundant before the advent of the white man, and suffering a uniform decline with the spread of settlements." Then he goes on to prove that such is not the case. "First comes the virgin or presettlement stage. Our knowledge of this is conjectural only. It seems likely that quail were confined mostly to the edges of the prairies and to open woods made park-like by frequent fires. There were probably severe fluctuations in abundance, and also distinct seasonal movements by reason of change in weather, fire, mast, seed crops, and predators." "Next came the area of settlement and crude agriculture. The settler brought with him grain fields, civilized weeds and rail fences." "Grain, brush, weeds, and hedges, stabilized the quail crop, and extended the area of quail range. There was a gradual but very large increase in total numbers and in distribution." "Third came the era of agricultural intensification. The weedy rail fence was replaced by the naked wire. Bushy woods were converted into bare pasture, and hedges were uprooted from the prairie farms". "They were accompanied by a decrease in quail, frequently due to overshooting, and nearly always due to a decrease in the area of habitable range." "Close on the heels of the agricultural intensification came the era of agricultural depression, good roads, and automobiles. Reversion of marginal lands created additional cover and food in some states, but this advantage was about offset by the sudden spread of good roads, and motor travel, a further increase of population and leisure time, and further improvements in arms and ammunition. Out of all this comes the posted farm, the impending threat of the songbird list, and the eleventh hour to legislate the conservation of a shrinking resource, or to bolster it up with foreign substitutes. Finally has

come the extremely recent realization that quail are a crop, the production of which can be aided by legislative enactments, but accomplished by one and only one method, namely the modification of the land to make the environment favorable."

There are a few people that have done some excellent research in the management side of the problem. Among the most important of these are H. L. Stoddard and C. O. Handley's work in Southern Georgia, Paul Errington's work in Iowa and Wisconsin, Aldo Leopold's work in Wisconsin, and Verne Davison, formerly Cooperative Superintendent of the Arnett, Oklahoma, Experimental Quail and Prairie Chicken Management Project. None of this work has been done under conditions such as are found in Virginia, therefore, their results or procedure cannot be applied directly to conditions as found in Virginia.

W. L. McAtee[2] in his abridged report of Verne Davison's report of the Arnett, Oklahoma, Experimental Quail and Prairie Chicken Management Project, stated, "Areas averaging 5½ acres in size were fenced and in part cultivated for feed patches. Three-wire fences found not sufficient to exclude stock, cost on the average $22.77 per acre for labor and materials, and four-wire fences that did exclude cattle, $33.35. Drought kept down production in the 25 feed patches established. It was found, however, that 2 acres of feed to each section was inadequate for the wildlife that resorted to it, being entirely consumed prior to the period of greatest need which was late winter. Rabbits devoured a great deal of the feed patch vegetation and damaged plantings of trees and shrubs. It became apparent that plantations intended to benefit the prairie chicken and the bobwhite must be protected from rabbits." McAtee goes on to state that because of the drought that extended over that section for a

period of three years, that at the end of the third year there were forty percent less birds on the area.

H. L. Stoddard[3] in his work in Southern Georgia had excellent results in increasing quail on lands that were not used primarily for the production of crops or used for the pasturing of large numbers of cattle. The primary use of this land was to produce quail, and other wildlife. He says that there is no definite rule for the procedure of increasing quail in the field, but that each environment should be treated more or less individually. Listed below are some helpful suggestions that he has found to be successful.

1. Subdivide large fields -- leave strips of cover or broomsedge -- use maximum diversification of crops.
2. Turn strips of broomsedge every year, and make fire lanes.
3. Use fire correctly.
4. Correct predator control. (Leave the beneficial hawks)
5. Provide cover patches -- woody and plant type.
6. Burn flood areas before nesting seasons.
7. Subdivide large tracts of woods with cultivated fields.
8. Plant "Bird Feed Patches" of mixtures of the following - Austrian winter pea, vetch, cowpeas, beggar-weeds, kaffir corn, cat-tail millet, Egyptian wheat, watergrass bullgrass, brown top millet, hog millet, German millet, upland rice, buckwheat, rye, oats, corn, peanuts, and chufa.
9. If possible supply wild fruits of different kinds.

Aldo Leopold[4] in his book GAME MANAGEMENT states that, "----- all of the factors of productivity are interwoven, and react upon each other as upon the game whenever there is a change in any one of them. This interaction is especially pronounced as between food, water, coverts, and special factors. In actual management their control is all one problem." In other words the problem of game management is one of the ecological nature rather than one of just changing one factor.

PROCEDURE

Preliminary Survey -

In the fall of 1935, C. O. Handley, W. W. Bailey, and J. P. Newman made a quail census of the area. Their count was 196 birds. During the ensuing winter, 109 birds were trapped, 70 of them being cocks and 39 hens.

In January 1936, a map was secured that showed the boundaries of the area, the woods, and the topography, but it did not show all of the fences and fields. These fences were paced and put on the map. The covey ranges were shown on the map.

A close survey was made of the area to determine what were the limiting factors, and it was decided very easily that the main factor was the lack of cover. This lack of cover was due to the heavy grazing by cattle over most of the area. The woods were composed mainly of virgin white oak, therefore even the woods could hardly be considered good quail cover. The result was that the feed patches would also have to serve as cover patches.

In certain sections on the area there were an excellent variety of plants that could supply food and cover for quail. Below is a list of most of the more common ones with their botanical names. Throughout the rest of this thesis the plants will be referred to by their common names.

1. Wild Roses - Rosa virginiana and others - fairly common
2. Violets - Viola spp. - fairly common
3. Wild carrot - Daucus carota - abundant
4. Horse mint - monarda fistulosa - abundant
5. Speedwell - Vironica spp. - common
6. Plantain - Plantago spp. - common
7. Ragweed - Ambrosia spp. - common
8. Clovers - Trifolium spp. - common
9. Locust - Robinia Pseudo Acacia - common
10. Beggarweed - Desmodium - common
11. Lespedeza - Lespedeza repens, L. frutescem, L. hirta and L. virginica - fairly common
12. Hog peanuts - Amphicarpa monaica - abundant in areas
13. Red bud - Cercis canadensis - fairly common
14. Foxtail grass - Algsecurus spp.- abundant

15. Panic-grasses - Panicum spp. - abundant
16. Iron weed - Veronica officinalis - abundant
17. Paspalum grasses - Paspalum spp. - abundant
18. Sedges - Carex spp. - abundant
19. Maples - Acer spp. - abundant
20. Oaks - Quercus Alba most abundant - abundant
21. Pines - Pinus spp. - scarce
22. Climbing Bitter Sweet -
23. Dogwoods - Cornus spp. abundant
24. Thorn bushes - Crataegus spp. - very abundant
25. Huckleberry - Gaylussacia spp. - abundant
26. Black Haw - Viburnum spp. -
27. Thorn apples - Pyrus spp. - fairly abundant
28. Virginia Creepers - Parthenocissus quenquefolia - common
29. Wild Cherry - Prunus serotina - abundant
30. Wild Plum - Prunus spp. - abundant
31. Sumac - Rhus glabra - common
32. Poison Ivy - Rhus app. - abundant
33. Catbrier - Smilax spp. - abundant
34. Touch-Me-Not - Impatiens spp. - common
35. Grapes - Vites spp. - common
36. Buttercups - Ranunculus spp. - common
37. Coral-berry - Symphoricarpos orbiculatus - scarce
38. Blackberry and Raspberry - Dewberry - Rubus - abundant
39. New Jersey tea - Ceanathus Americanus - fairly common
40. Climbing False Buckwheat - Polygonum scandens - fairly common

In the pasture areas feed and cover plants were scattered and were found mainly along the edges of woods. In areas not pastured for several years a very good stand of both developed. To provide additional cover in a few years it was decided to plant shrubs, vines and trees.

Environmental Improvements -

Grape Cuttings.

On March 5, 1936, approximately one thousand wild grape vine cuttings were made mainly from the previous year's growth. These cuttings were then put in water with the lower end down until planted. Particular attention was given that the lower end was put in the ground past the second bud when they were planted in the field. Seven hundred and nineteen cuttings were planted at different places in the area, along fences, around brush piles, along

fallen trees, and along ditch banks. Due to the drought that came in the early summer none of the cuttings lived. Most of them put out leaves and made some growth, before they died.

Korean Lespedeza Plantings.

Seven hundred pounds of Korean lespedeza were sown from March 16, 1936 to April 17 at different places over the area. The total acres sown was 43. The average rate planted per acre was approximately 16½ pounds. In blue grass pastures the ground was disced up before sowing, but in wheat and rye it was just sown on the ground. In gullies the banks were raked with a garden rake before sowing, and in one case the bank was mulched with wheat stubble cutting. All but two of the lespedeza plantings did well. One of those, a small fence plot directly across the creek from the college sewage plant was crowded out by the blue grass and broom sedge. The sod was so heavy that it did not allow the lespedeza to become established. The other place that did not do well was the little orchard to the west of Mrs. Heth's residence. The weeds and blackberry vines crowded it out. In both places the ground had been well disced. The Korean lespedeza was sown in small patches near the feed and cover patches, there were six cases where the lespedeza was sown adjacent to cover and not to the feed patches.

In the pasture areas, part of the Korean lespedeza plantings were included in the enclosed part of the patch for the purpose of comparing the growth, and the ability of reseeding of the grazed and non-grazed lespedeza. At this early date (May 15, 1937) it is impossible to state how the heavily grazed lespedeza will reseed itself. It is estimated that the average height of growth for non-grazed Korean lespedeza was about 5 inches and the heavily grazed was about 2½ inches. It is the writer's opinion that light grazing

increases branching of the stalks and thereby increases seed production. See the large map for information as to the locations of these plantings.

Lespedeza sericia plantings.

Approximately seventy pounds of lespedeza sericia was planted on the area during May 1936. In all of the feed and cover patches except those that were planted to buckwheat a strip about two feet wide all around the outer edge of the cultivated area was sown to sericia along with the other seeds. Plantings were also made in eroded and small gullied areas in the pastures. These places were raked, and then sown. The plantings in the feed patches did not make a very big growth, or many seed, but it appears that a large percentage survived the winter successfully. The plantings sown in the bare and eroded places in the pastures did not do very well. At least part of their failure was due to the cattle tramping it out, and in using such places to kick up the dust to dispose of flies. For information as to the locations of these plantings see the large map of the whole area.

Sumac Plantings.

On April 4, 1936, two gallons of smooth sumac mach seeds were collected from the plants that are located southwest of the main entrance from the Price's Forks road into the Heth's residence. The seeds were kept at room temperature until April 8, 1936 at which time they were planted in seven small plots at different places over the area. The seeds were not treated in any way to aid in germination. The plots on the average were about four by eight feet in size. The ground was dug with a mattock, and the seed bed was well prepared. None of the seed developed into seedlings during the spring and summer of 1936, or the spring of 1937. It is supposed that the drought in the early part of the summer of 1936 may be the reason for no growth. For information concerning the locations of these plantings refer to the large map.

Honeysuckle plantings.

During August 1936, honeysuckle plantings were made in sixteen of the feed and cover patches. The plantings were made in the corners of the fences in order that the vines could grow up on the fence, and in eleven of those feed and cover patches old discarded wire was fastened to the wire of the fence, with the idea of putting a stake under it in order to provide a shelter after the honeysuckle has grown over the wire. The stakes have not been put in yet. There was about seven plants put at each corner. Approximately three-fourths of the plants lived. Plantings were made in two gullies. They were placed in rows across the gully to aid in the stopping of erosion.

During April of 1937 additional honeysuckle plantings were made in feed and cover patches. These plantings were made similar to the others, and in places where those planted the year before died. In the gullies more plantings were made. The plants were planted around brush piles and around feeding shelters.

For information concerning the location of these plantings see the small individual feed and cover patch maps.

Privet Seedlings and Seed Plantings.

In May 1936, approximately five thousand privet seedlings were secured from under privet bushes that are located in front of the Agricultural Hall. These seedlings were planted in rows in four different beds. These seedlings were cultivated three times during the ensuing summer. During April of 1937 these seedlings were transplanted in rows and groups inside the enclosed feed and cover patches, but outside of the cultivated areas. Approximately ninety-five percent of the plants were alive on May 15th.

Seeds were collected from the same bushes referred to above, during June 1936. These seeds were planted in corners of several feed and cover

patches. The seed bed was prepared by digging with a mattock, and the seeds were raked in and then the ground was packed by tramping. None of the seeds developed into seedlings by May 15 of 1937.

Coralberry Plantings.

In April 1937 coralberry plants were dug up and transplanted into groups and rows in thirteen feed patches, and in two gullies. In the gullies they were planted in rows across the gullies, to aid in the stopping of erosion. They were planted approximately one foot apart. For information concerning the location of the coralberry plantings see the individual small feed and cover patch maps.

Pine Plantings.

Five hundred short leaf pines (Pinus echinata) and five hundred pitch pines (Pinus rigida) were received from the State Nursery at Charlottesville, Virginia, in April 1936. They were heeled into until able to plant them. They were planted along the fences in the feed and cover patches on the windward side. In several patches they were planted in two rows. The purpose was for them to act as a windbreak in a few years, and to also provide cover and food when they have grown more. Approximately 40 percent of them survived the drought period that came during May and the early part of June. Only about 700 of the pines were planted in the area.

Five hundred red pines (Pinus resinosa) and five hundred loblolly pines (Pinus Taeda) were received from the State Nursery at Charlottesville, Virginia, in April 1937. They were heeled in for about ten days and then were planted in the feed and cover patches of the area. They were planted in rows along the fences on the windward side. Approximately 900 of them were

used on the area. For information concerning the location of these plantings see the small individual feed and cover patch maps. The species of pines were not kept separate as to the location of the plantings.

Locust Plantings.

During April of 1936 one thousand locust seedlings and also in April 1937 five hundred locust (Robina Pseudo-Acacia) were received from the State Nursery at Charlottesville, Virginia. These seedlings were heeled in until planted, which was within a few weeks. They were planted in the feed and cover patches, to provide some cover in a few years, and to provide seed as food when they matured. Some were planted in a gully to aid in stopping erosion. In the gully they were planted on the banks and in the bottom. Approximately seventy-five percent of those planted in 1936 survived. For information as the locations of these plantings see the small individual feed and cover patch maps.

Chestnut Tree Plantings.

During April of 1936 three hundred and thirty some and also in April of 1937 two hundred and eight blight resistant chestnut trees were received from the Biological Survey to be used on the area. The average height of the trees was about two feet. The trees were heeled in until they were planted, which was within two or three weeks. The area in which they were planted was fenced to protect them from cattle and other livestock. All of the trees that were planted in the area near the College Spring that were planted in 1936 were watered once, and those nearest the College Spring were watered twice. In watering the trees the ground around the trees was dug out to leave a depression to hold about two gallons of water. After the water had

soaked into the ground the dry dirt was pushed back into the hole. Part of the two rows of trees the fartherest from the small creek in Feed and Cover Patch No. 25 were watered once. It is impossible at the present time to determine the number of trees that survived, since a large percentage of them are coming up from the root stock. It is questionable under those conditions whether the plants are the grafted blight resistant chestnut or whether they are just shoots from the native root stock. It is estimated that approximately fifty percent of the trees survived. The trees that were planted in 1937 were well watered at the time of planting. Twenty-nine of the trees were planted on the Mountain Lake area. For information concerning the location of these plantings see the large map of the whole area.

Feeding Shelters.

There were 15 feeding shelters constructed in conjunction with 14 of the feed and cover patches. The purpose of the feeding shelters in feed patches was to furnish emergency and escape cover as well as additional feed. It was found that feeding shelters of the lean-to type, which were open on three sides were very unsatisfactory. The Cooper hawks were able to fly under the shelter and catch a quail before it could escape. There are two or more instances on record of the Cooper hawk catching quail under open feeding shelters. By putting brush and tree tops across the three open sides so as to prevent a hawk from flying under the shelter proved fairly satisfactory. But as a whole the writer considers the feeding shelter as unsatisfactory, because it localizes the birds at a given place day after day, which means an increase in predation.

Two shelters of unhusked corn on the stalks were constructed at feed and cover patches Nos. 1 and 2.

Two shelters of unhusked corn on the stalk and kaffir corn were constructed at feed and cover patches Nos. 3 and 4.

Two shelters were constructed of brush and unhusked corn on the stalk at feed and cover patches No. 5 and 6.

Five shelters were constructed of kaffir corn at feed and cover patches Nos. 25, 28, 32 (2), and 34.

Two shelters were constructed entirely of brush at feed and cover patches Nos. 9 and 10.

Feed and Cover Patches.

Since cover was decided as being the major limiting factor and feed was the second, the plan was to provide cover in the shortest time possible. Therefore, the feed patches were situated in such a manner as to provide cover as well as feed for the quail. During the first few years of this project, until natural and planted cover develops, a large part of the cover must be furnished by annual plantings of grains in patches and in fields not to be used by cattle.

During the spring and summer of 1936, thirty-four feed and cover patches were plowed, disced and sown to grains. Twenty-five of the patches were fenced. Woven wire and one strand of barbed wire were used on those in pastures where sheep and hogs ranged and three strands of four-barbed cattle wire was used in areas where only cattle were pastured. Steel posts were used on the line fence, and locust posts on the corners. The corner posts were braced from near the top by a small fence post to a stake driven into the ground. An entrance was left into the patch by attaching the wire to a stick and the stick was fastened to the corner post by wire loops. In several cases the wire was merely stretched taut and wrapped around the corner post. The average size of the patches enclosed was approximately one-fifth of an acre.

Due to drought that occurred in May and in most of June in 1936 all of the patches could not be plowed and planted as planned. During the middle of May 1936, seventeen patches were plowed, disced and sown by the use of a wheat drill to a mixture of 53½ percent kaffir corn, 24½ percent Brabham cowpeas, 12¼ percent Tennessee German millet, 10 percent Sudan grass and the outside two foot edge had lespedeza sericia added. The seeds were sown at the rate of approximately 62 pounds per acre and commercial 4-12-4 fertilizer was drilled in at the time of sowing at the rate of approximately 200 pounds per acre. It was necessary to chop out part of the plants after they had begun to grow because it was too thick. The patches did not receive any cultivation. One of these patches was destroyed by cattle.

Three patches were planted to kaffir corn in rows on May 16 in order that it could be cultivated and harvested. A corn planter was used in planting. The seeds were sown at the rate of approximately 12 pounds per acre and 4-12-4 fertilizer was applied at the rate of approximately 250 pounds per acre. These patches were cultivated twice during the summer. One patch was cut and shocked similar to corn when mature, and in another the heads cut off in harvesting.

About July 10th ten patches were disced with a Wheatland disc plow and sown to buckwheat. The seeds were sown at the rate of approximately 75 pounds per acre, and the 4-12-4 fertilizer was applied at the rate of approximately 250 pounds per acre.

In certain places on the area there was sufficient native growth of weeds and shrubs that would be excellent cover if they were protected from cattle. There were eight of these cover patches, three of them were fenced with two strands of 4-barbed cattle wire, one was already fenced and only needed to have the gate closed to keep the cattle out. Two cover patch areas were along old rail fences and did not need to be fenced to protect the growth of weeds and

shrubs. Korean lespedeza was sown along them to provide additional feed.

For further information concerning the feed and cover patches see the large map of the area for locations, and the small individual maps for detailed information.

FEED AND COVER PATCHES, MAPS, AND COST

Feed and Cover Patches Nos. 1, 2, 3 and 4.

This area was a strip of woods about fifteen hundred feet long and about 400 feet wide. Along one side, between the woods and the field on the college side was a narrow strip of open land. This was disced and sown to Korean lespedeza. In certain sections of the woods there were good stands of huckleberry and blackberry thickets. On the college side of the woods there was a wheat stubble field. At the end of the woods closest to the college spring, was a bushy area. In it was old discarded fence wire, a sumac thicket, and a small honeysuckle thicket. Nearby was a small coralberry thicket.

There were about 384 blight resistant chestnut trees planted in the open strip of land and in the woods. The area where the trees were planted was fenced to protect the trees and to allow cover for quail to develop.

These patches were disced with a Wheatland disc plow on July 11, 1936 and were sown to buckwheat on the same date. Due to the drought in May it was impossible to plow these patches before that date. Therefore, only buckwheat was seeded at this late date. Ten pounds of buckwheat were sown at a rate of approximately 75 pounds per acre. The buckwheat made very good growth and produced a good yield of seed. Approximately 50 percent of the seeds on the ground had not spoiled by March 26, 1937. On May 15, 1937 there was a very good stand of volunteer buckwheat in the patch.

Doves used the patches from fall on through the winter and spring. Quail seemed to feed in the patch from time to time, and also used the feeding shelters which were lean-to shelters of corn on the cob and fodder, and kaffir corn.

In the late fall of 1936 there were 39 birds on this area and in the spring there were 12 birds. It is thought that the actual residentual birds

on the area numbered 24 and that the 15 other birds were in the process of the fall shuffle when counted in the late fall. Nine birds were accounted for in predation. The birds were lost by being killed by hawks, cats, dogs, accidents and trapping.

Cost of feed and cover patch No. 1:

Fencing

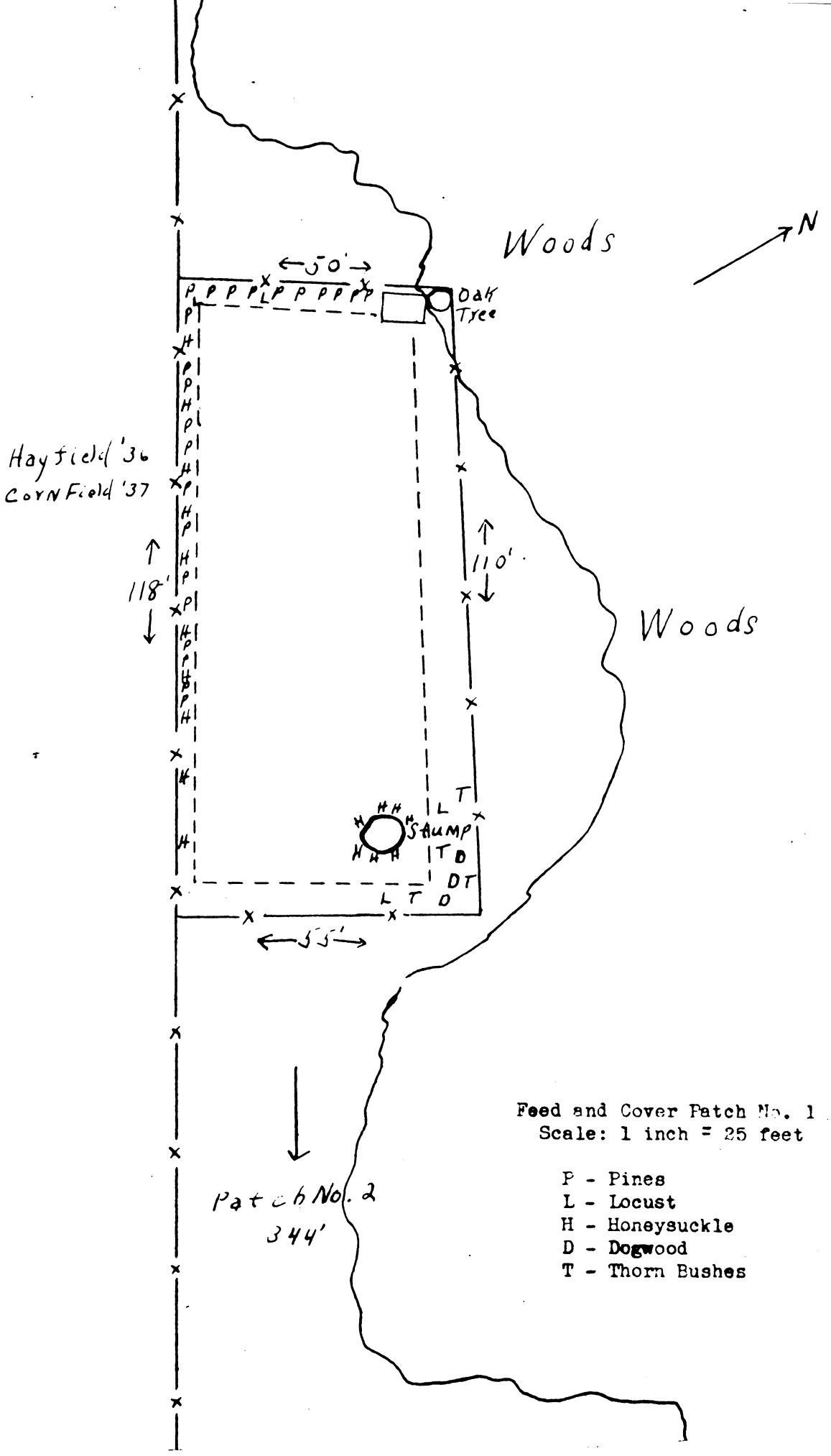
6 steel posts - .3145¢ each	$ 1.89
4 locust posts - .25¢ each	1.00
215 ft. Barbwire (x3 strands)	1.18
Staples and nails	.05
Labor for fencing (3 hours)	.75

Planting (1936)

Discing for Korean lespedeza - 1/2 hour - no charge	
Sowing Korean Lespedeza - 1/4 hour	.06
10 pounds Korean Lespedeza at 6¢ pound	.60
Discing for buckwheat - 3/4 hour	.75
Sowing buckwheat - 1/2 hour	.12
10 pounds buckwheat at 2.4¢ pound	.24
30 pounds 4-12-4 fertilizer	.36

Planting (1937)

26 Pines	
4 Locust	
18 Honeysuckles	
6 Thornbushes	
3 Dogwoods --- (1 hour for all)	.25
Total	$7.25


Woods
N
50'
Oak Tree
Hayfield '36
Corn Field '37
118'
110'
Woods
Stump
Patch No. 2
344'
Feed and Cover Patch No. 1
Scale: 1 inch = 25 feet
P - Pines
L - Locust
H - Honeysuckle
D - Dogwood
T - Thorn Bushes

Cost of Feed and Cover Patch No. 2:

Fencing

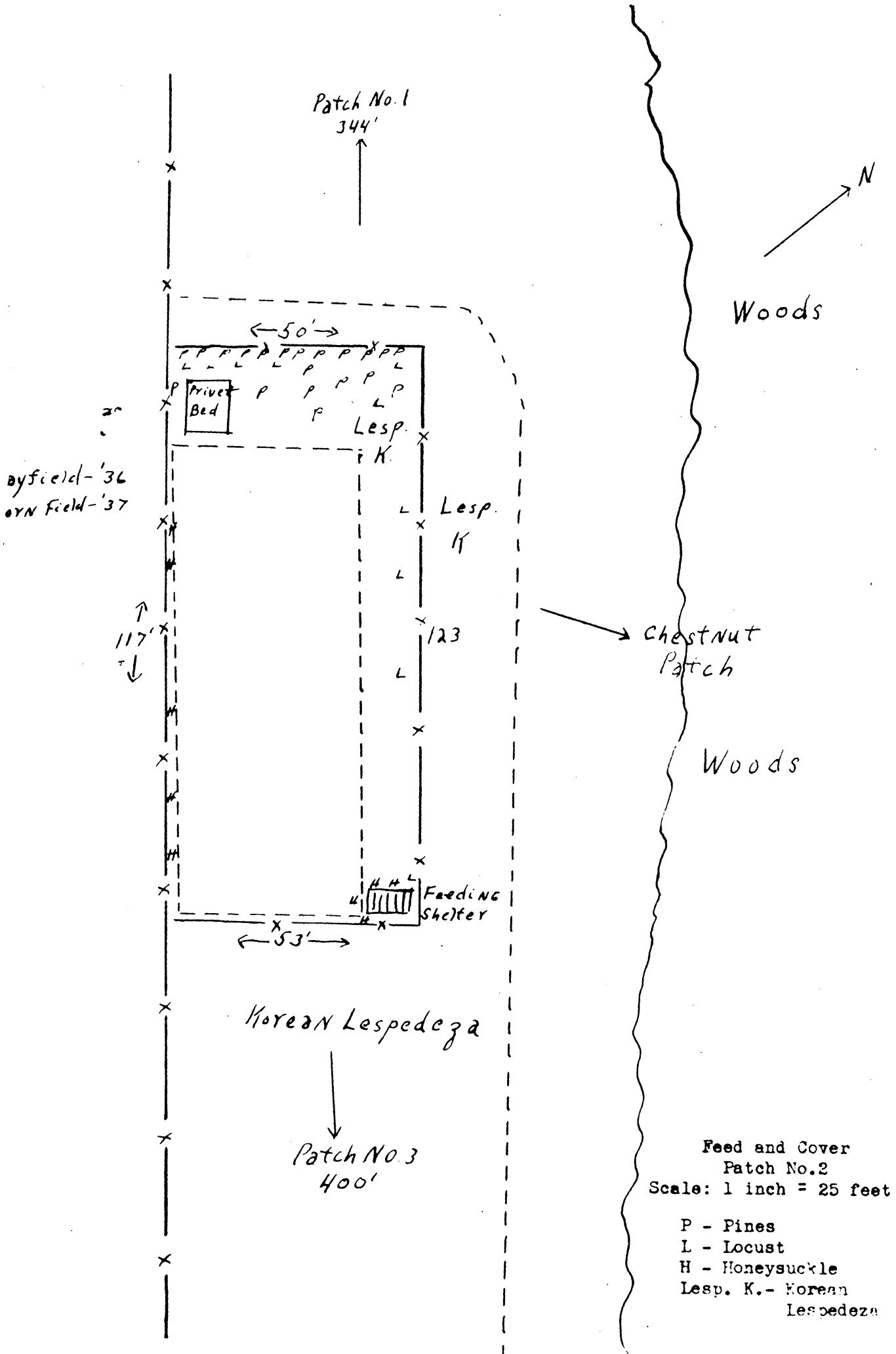
7	steel posts - .3145¢ each	$ 2.20
5½	locust posts - 25¢ each	1.37
226	feet barbed wire (x3 strands)	1.25
	Labor Fencing - 3½ hours	.87

Planting (1936)

	Discing for Korean Lespedeza - 1 hour	1.00
	Sowing Korean Lespedeza - 1/2 hour....	.13
15	pounds Korean Lespedeza at 6¢ pound ..	.80
	Discing for buckwheat - 1 hour	.75
	Sowing buckwheat - 1/2 hour	.12
10	pounds buckwheat at 2.4¢ per pound ...	.24
6	Locust	
28	pines	
1	Privet bed - 3 hours for last three ..	.75
	Feeding shelter - 1 hour	.25

Planting (1937)

11	Pines	
9	Locust	
15	Honeysuckle - 3/4 hour for last three	.18
	Total	$ 9.81


Patch No. 1
344'
N
Woods
50'
Privet Bed
Lesp. K.
Lesp. K
123
117'
Chestnut Patch
Woods
Feeding Shelter
53'
Korean Lespedeza
Patch No 3
400'
Feed and Cover
Patch No.2
Scale: 1 inch = 25 feet
P - Pines
L - Locust
H - Honeysuckle
Lesp. K.- Korean
Lespedeza

Cost of Feed and Cover Patch No. 3:

Fencing

24	Steel posts - .3145 each	$ 7.55
3½	locust posts - 25¢ each	.88
500	feet woven wire	6.82
672	feet barbed wire	1.23
	Staples and nails	.15
	Labor fencing - 11 hours (repairing,etc.)	2.25

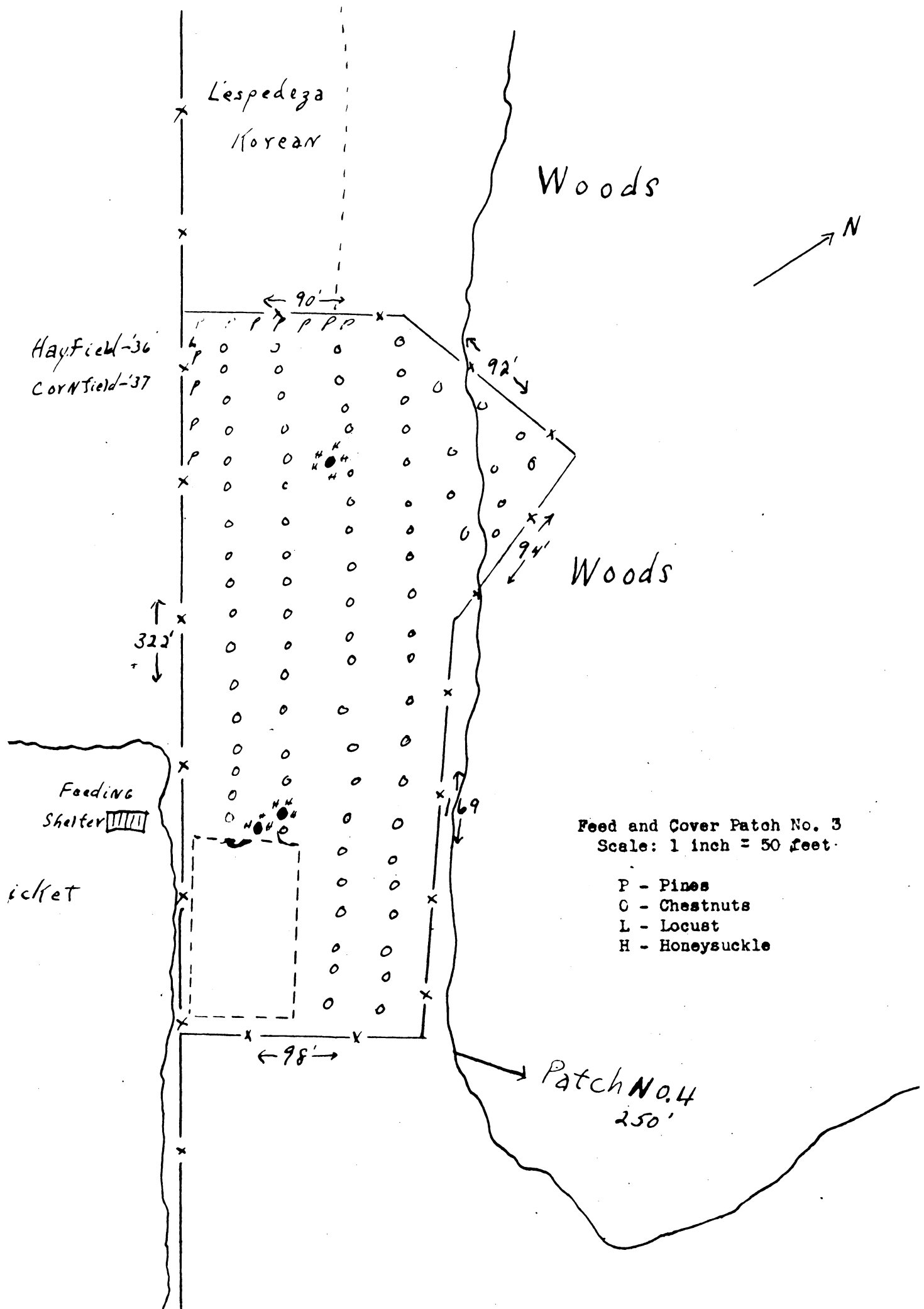
Planting (1936)

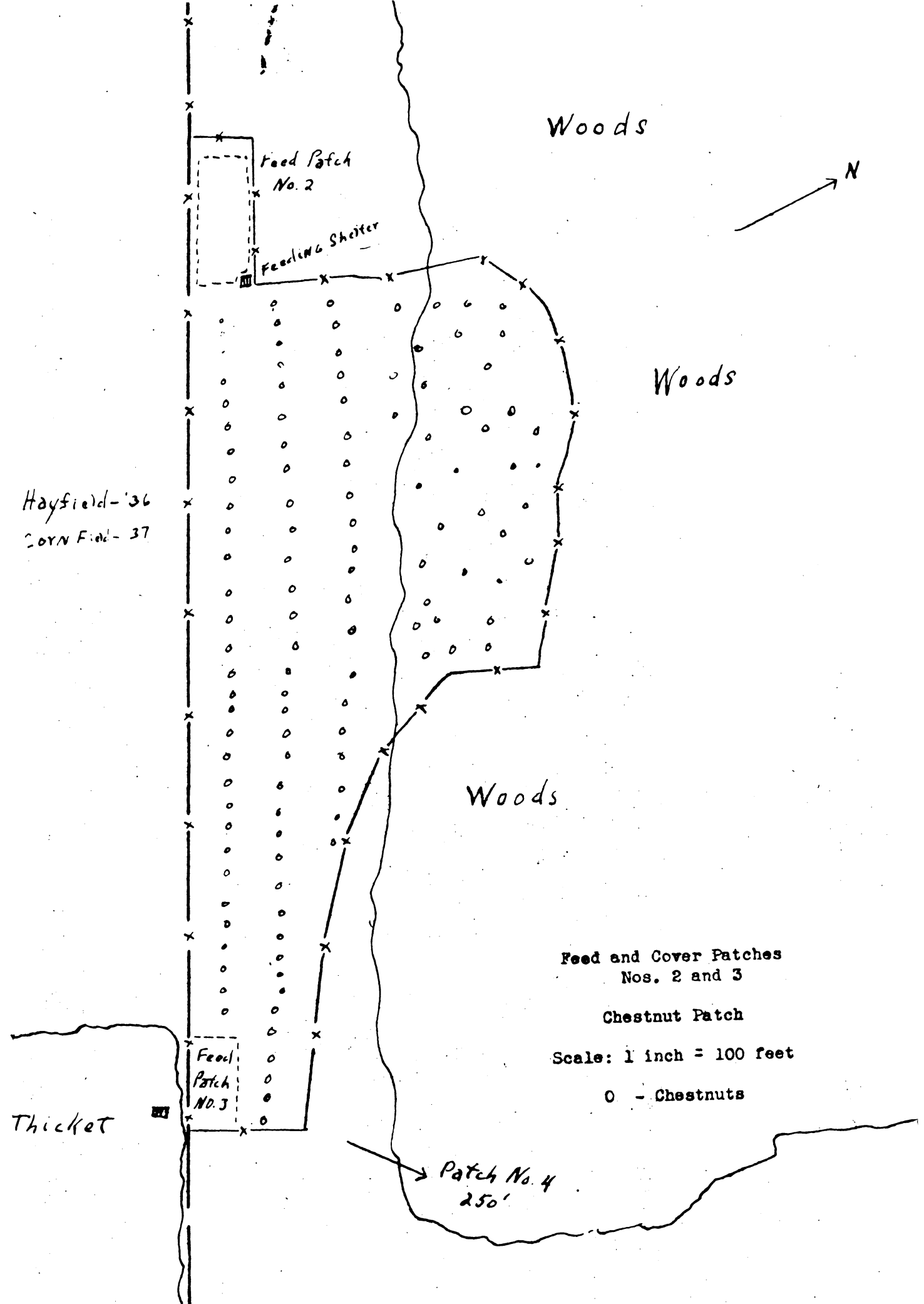
	Discing for Korean Lespedeza - 1 hour	1.00
	Sowing Korean Lespedeza - 1/2 hour ...	.12
12	pounds Korean Lespedeza - 6¢ pound ..	.72
	Discing for Buckwheat - 1 hour	1.00
	Sowing buckwheat - 1/2 hour	.13
11	pounds buckwheat at 2.4¢ pound	.26
	Labor planting 85 Chestnut trees - 5 hr.	1.25
	Labor watering " " - 4 hr.	1.00

Planting (1937)

73	pines	
20	Locust - 1 hour for all -	.25
	Total	$24.61

Note: During April 1937 one hundred and seventy nine blight resistant chestnut trees were planted in the area between the feed and cover patches Nos. 2 and 3 and the Chestnut patch. The fences were rearranged to have all three areas into one. The same amount of wire was used as was used in enclosing the three separate areas. The fence after the rearrangement was woven wire in part and three strands of barbed wire in part. Fifteen steel posts were left over.


Lespedeza
Korean
Woods
N
90'
Hayfield-'36
Cornfield-'37
92'
94'
Woods
322'
Feeding
Shelter
69
icket
Feed and Cover Patch No. 3
Scale: 1 inch = 50 feet
P - Pines
C - Chestnuts
L - Locust
H - Honeysuckle
98'
Patch No. 4
250'


Woods
Feed Patch No. 2
Feeding Shelter
N
Woods
Hayfield - '36
Corn Field - 37
Woods
Feed Patch No. 3
Thicket
Patch No. 4
250'
Feed and Cover Patches
Nos. 2 and 3
Chestnut Patch
Scale: 1 inch = 100 feet
0 - Chestnuts

Cost of Feed and Cover Patch No. 4:

Fencing

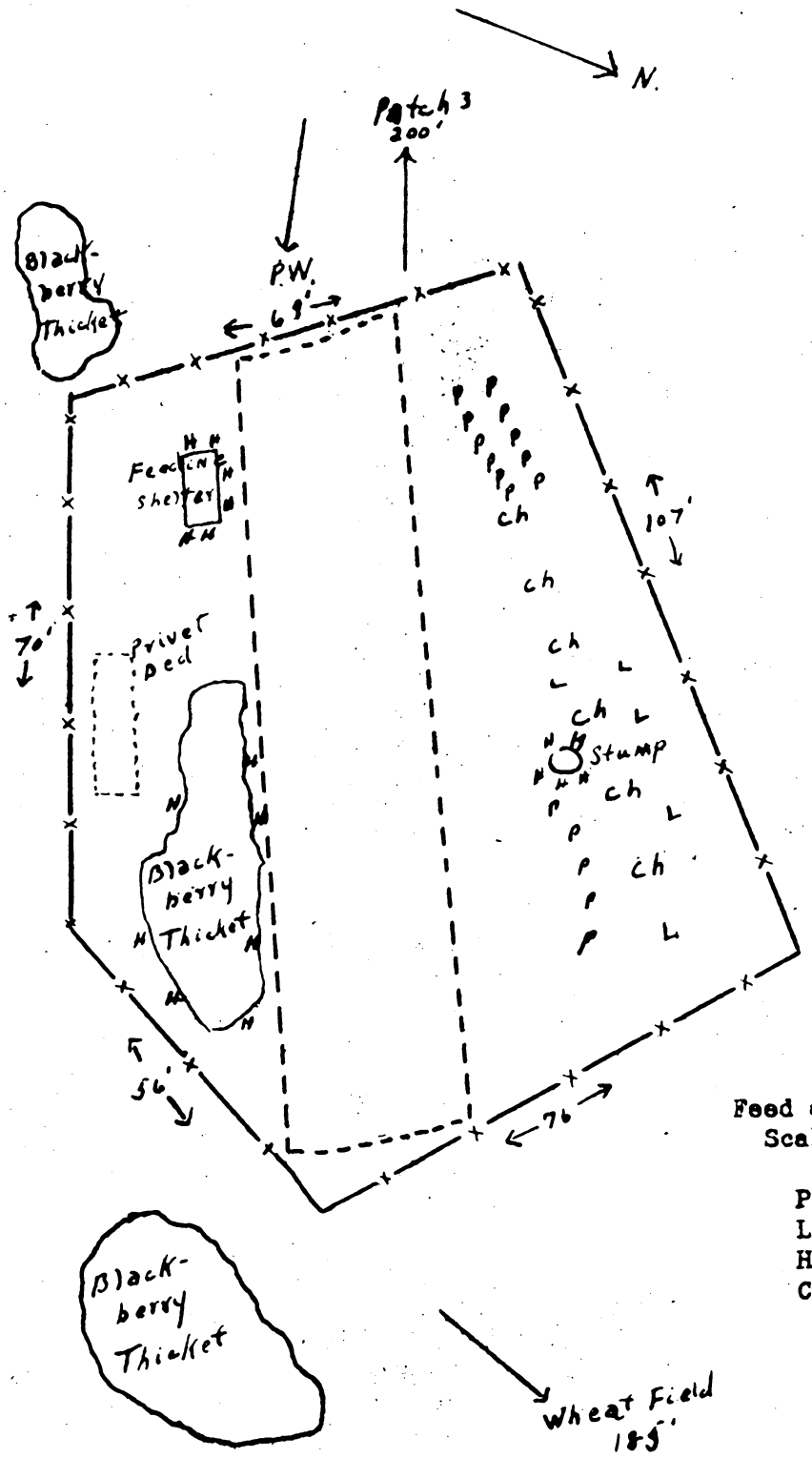
12	steel posts - .3145 each.....	$ 3.77
2	locust posts - 25¢ each	.50
378	feet of barbed wire (x2 strands) ...	1.40
	Nails and staples	.10
	Labor - fencing - 2½ hours	.65

Planting (1936)

	Discing for buckwheat - 1 hour	1.00
	Sowing buckwheat - 1/2 hour	.12
8	pounds of buckwheat - 2.4¢ pound ...	.20
36	Pines	
6	Chestnuts	
1	Privet bed	
15	Locusts --- 3½ hours for last four	.88

Planting (1937)

10	Pines	
15	Honeysuckle	
6	Locust - 1/2 hour for all.....	.12
10	pounds of Korean Lespedeza ... 17¢ pound	1.70
	Total	$ 9.24



Feed and Cover Patch No. 4
Scale: 1 inch = 25 feet

P - Pines
L - Locust
H - Honeysuckle
Ch - Chestnut

Feed and Cover Patch No. 5:

The area around Feed and Cover Patches Nos. 5 and 6 was a very heavily grazed pasture to the east and an open park like woods to the west. To the north was a wheat stubble field in the fall of 1936. There was practically no cover nearby.

This patch was disced with a Wheatland disc plow on July 10, 1936 and was sown to buckwheat on the same date. Due to the drought in May and June this patch could not be prepared for planting before that date, and at such a late date buckwheat had to be used for a crop to mature before frost. Ten pounds of buckwheat was sown at a rate of approximately 75 pounds per acre. It grew well and produced a good yield of seeds. There were 12 birds that used the patch almost continuously from the latter part of August until the middle of September., About the middle of September, cattle got into the patch and destroyed it. The lespedeza plantings in the field nearby made good growth and a good yield of seeds. The birds were not seen again in that section but it is supposed that they moved to the area of feed patches Nos. 1, 2, 3 and 4. In early December two lone birds were seen feeding at the feeding shelters located at Patches Nos. 5 and 6.

Cover was one of the major needs of that immediate section, therefore, plantings were made of pines, locust, privet, honeysuckles, coralberry, and a bed was sown to sumac seeds. None of the sumac seeds grew.

Cost of Feed and Cover Patch No. 5:

Fencing:

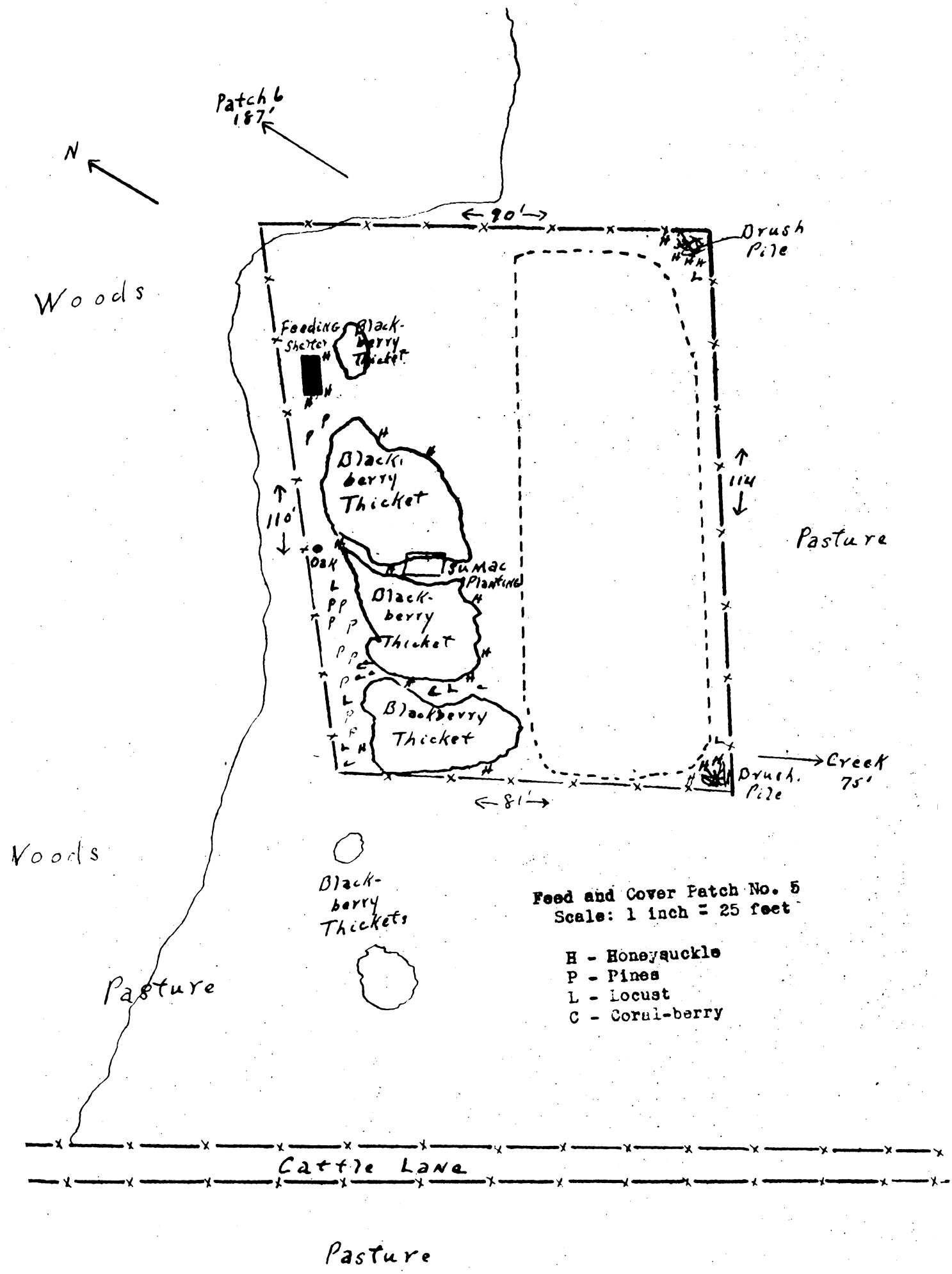
12	steel posts - .3145¢ each.....	$ 3.77
5½	locust posts - 25¢ each	1.38
	Staples and nails	.05
	Labor building fence - 5 hours	1.25
	Labor repairing fence - 1½ hours	.30
	Labor repairing fence - 1/2 hour	.13
400	feet barbed wire (x3 strands)	2.20

Planting (1936)

	Discing with Wheatland disc for Buckwheat	.80
10	pounds buckwheat - 2.4¢ per pound ...	.24
	Sowing buckwheat - 1/3 hour	.08
	Sumac seed planting - 1½ qt. - 1 hr..	.25
16	pines	
16	locust - 1/4 hour. for all	.06
19	pounds Korean Lespedeza on 1.29 A. ..	1.14
	Sowing Korean Lespedeza - 3½ hours ..	.87
30	pounds of 4-12-4 fertilizer	.36

Planting (1937)

12	Honeysuckle	
16	Coralberry	
18	pines	
6	Locust	
8	Privet -- 1/2 hour for all	.12
	Total	$13.00


Patch 6
187'
N
90'
Brush Pile
Woods
Feeding Shelter
Black-berry Thicket
Black-berry Thicket
110'
114'
Pasture
Oak
Sumac Planting
Black-berry Thicket
Blackberry Thicket
Creek
75'
Brush Pile
81'
Woods
Black-berry Thickets
Feed and Cover Patch No. 5
Scale: 1 inch = 25 feet
H - Honeysuckle
P - Pines
L - Locust
C - Coral-berry
Pasture
Cattle Lane
Pasture

Feed and Cover Patch No. 6:

Since cover was the main limiting factor in this area of park-like woods and cleanly cultivated fields it was decided that it would be best to fence this patch and allow it to grow up in weeds. Feed would be furnished from the wheat stubble field and from the Korean lespedeza sown along the edge of the woods. The patch was fenced in early June 1936 with two strands of barbed cattle wire. Since there was mainly giant ragweeds, pokeberries and blackberries and no grass the cattle were excluded by the two strands of barb wire. The birds referred to in the description of patch No. 5 used this patch as escape cover. Being located in the woods as it is, the fence had to be repaired twice because of falling trees and limbs.

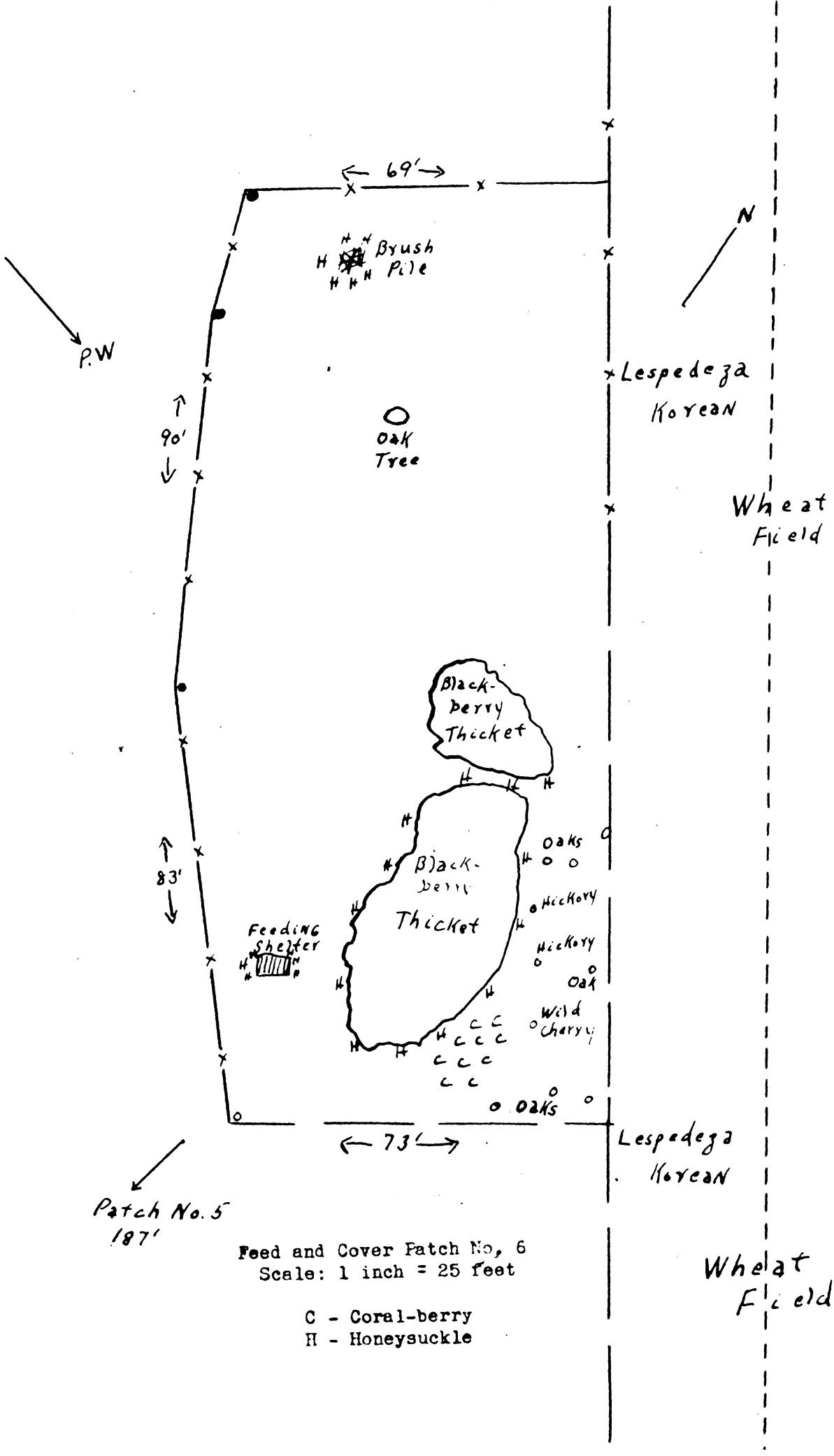
Cost of Feed and Cover Patch No. 6:

Fencing

8 steel posts - .3145 each	$ 2.52
315 feet of barb wire (x2 strands) .00184 ft.	1.16
Staples and nails	.05
Labor for fencing 1½ hrs. at 25¢ hour .	.38
Repairing fence twice - 1 hour.....	.25
Feeding shelter - 1 hr. labor	.25

Planting (1937)

14 Honeysuckle	
10 Privet	
10 Coralberry - 1/4 hours for all	.06
Total	$ 4.67



Feed and Cover Patch No, 6
Scale: 1 inch = 25 feet

C - Coral-berry
H - Honeysuckle

Feed and Cover Patch No. 7:

The patch was located at the edge of a park-like woods and the edge of a very heavily grazed pasture. The woods was composed of a virgin stand of oaks and hickories. There were a few dogwood scattered throughout. Due to the cattle and the shade there was very little low vegetation. In the pasture there was no cover suitable for quail.

The feed patch had an excellent thicket of thorn apples and wild plums on the north side, part of which was enclosed. The windward side was open, therefore, plantings of pines and locust were made to form a windbreak. Honeysuckles were planted along the fence and around the edge of the thicket to add to the cover. Coralberrys and privet bushes were also planted to add to the fruit supply.

This patch had to be disced July 10, 1936 because the drought in May and June prevented plowing before. Since the summer was so far advanced the only crop that could mature before frost was buckwheat. It was sown at the rate of approximately 75 pounds per acre. It made a good growth, and produced a good yield of seeds. Quail were known to use the patch only once and that was in October 1936. A large flock of doves used the patch almost continuously during the fall, winter and spring.

Korean Lespedeza was sown April 17, 1936 in the blue grass pasture 70 feet from the patch. The ground was prepared for the lespedeza by discing. The seeds were sown at the rate of 16 pounds per acre. It was grazed very heavily all spring and summer, and it is very doubtful whether sufficient seeds were produced to re-seed properly.

The fence was three strands of four-barb cattle wire. It was considered necessary to put steel posts as braces behind the steel posts to

reinforce them in case the cattle endeavored to push through. Cattle were excluded successfully.

Cost of Feed and Cover Patch No. 7:

Fencing

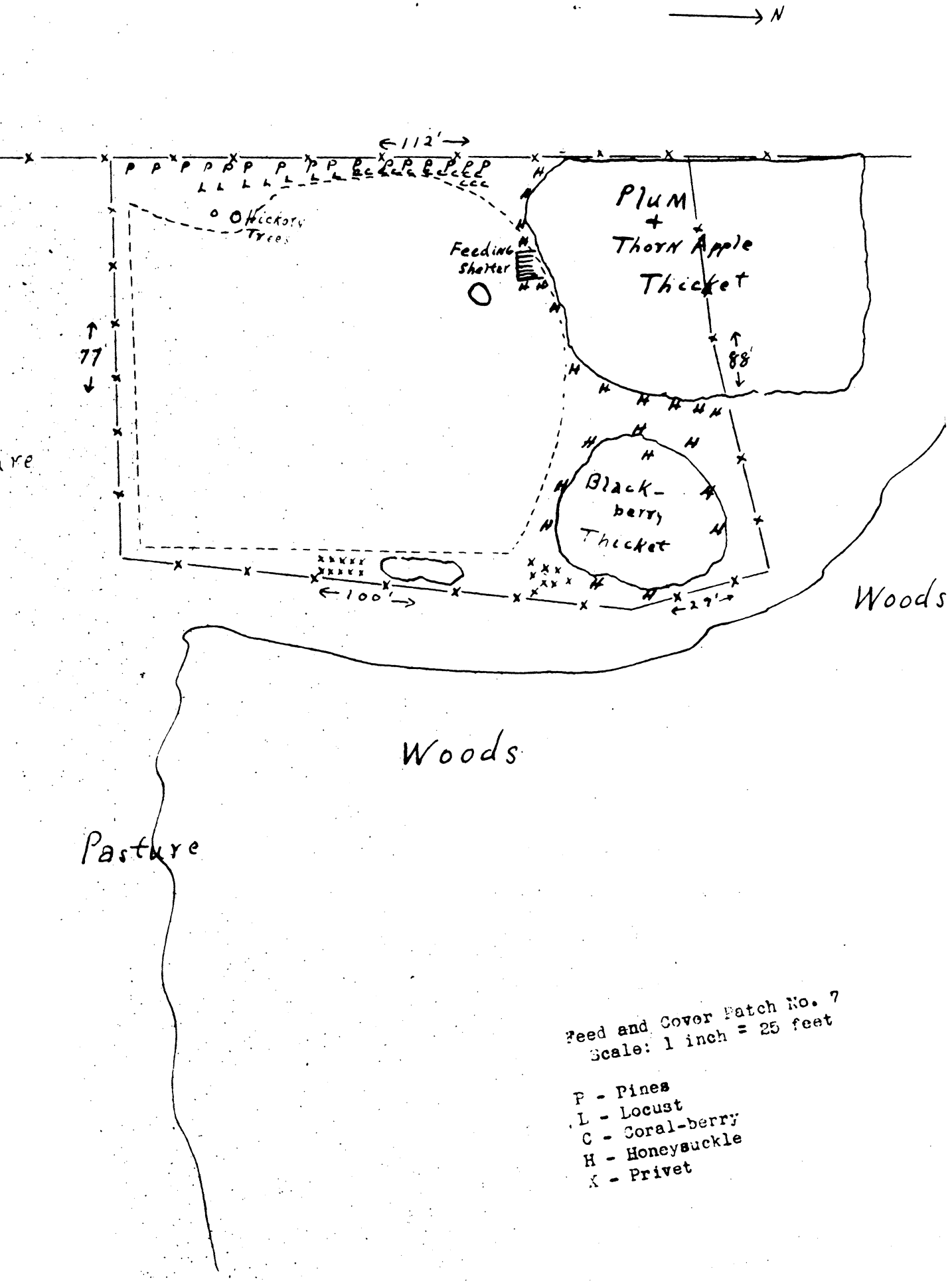
9 steel posts - .3145 each	$ 2.83
4 locust posts - 25¢ each	1.00
294 ft. barb wire (x3 strands)	1.62
Staples and nails	.05
Labor for fencing - 5 hours	1.25
Reinforcing fence - 1/2 hour	.13

Planting (1936)

Discing - 1 hour	.80
Sowing buckwheat - 1/3 hour	.08
10 pounds buckwheat at 2.4¢ per pound ...	.24
Discing for Korean Lespedeza - 3/4 hr.	.75
19 pounds Korean Lespedeza - 6¢ per pound	1.14
Sowing Korean Lespedeza - 3/4 hr.....,	.18
30 Pines - April 1936	
10 Locust - April 1936 - both for	.15
30 pounds 4-12-4 fertilizer	.36

Planting (1937)

38 Honeysuckles (March 24, 1937)	
11 Coralberry	
16 Pines (March 29, 1937)	
16 Locust (March 29, 1937)	
17 Privet (March 30, 1937)--- 1½ hours ..	.37
Feeding shelter - 1 hour	.25
Total	$11.20



Feed and Cover Patch No. 7
Scale: 1 inch = 25 feet

P - Pines
L - Locust
C - Coral-berry
H - Honeysuckle
X - Privet

Feed and Cover Patch No. 8:

The patch was located at the corner of a park-like woods that was heavily pastured, and an extremely heavily grazed pasture field. The woods was a virgin stand of oaks and hickories, with a few clumps of thorn apples, cratageus and blackberry thickets in the more open places. There was no low vegetation suitable for quail either in the field or in the woods. Therefore, a cover patch was fenced about 200 feet away from the patch. This cover patch is referred to as Patch No. 43.

This patch was also sown to buckwheat because the drought prevented preparing the soil soon enough for any other crop to mature. The buckwheat was sown at the rate of 75 pounds per acre. It did well and produced a good yield of seeds. There is no record of quail having used this patch, although the place appeared to be fairly well suited for quail. Not many doves used this patch.

Korean lespedeza was sown in the blue grass pasture. It was pastured extremely heavy and it is very doubtful if sufficient seeds were produced to re-seed itself properly. Part of the lespedeza planting was enclosed by a 2-strand barb wire fence, the buckwheat patch was enclosed with a 3-strand barb wire fence. Part of the steel posts around the buckwheat patch were reinforced by steel posts used as braces. The cattle were able to step through the 2-strand fence into the lespedeza plants and from there they could get into the buckwheat patch. The cattle got into the buckwheat patch three times, but were driven out each time before much damage was done.

Plantings were made of pines, locust, coralberry, privet, pines and honeysuckle to add to the cover present and also to supply fruit. Several large brush piles were already located in the patch before it was fenced.

Cost of Feed and Cover Patch No. 8:

Fencing

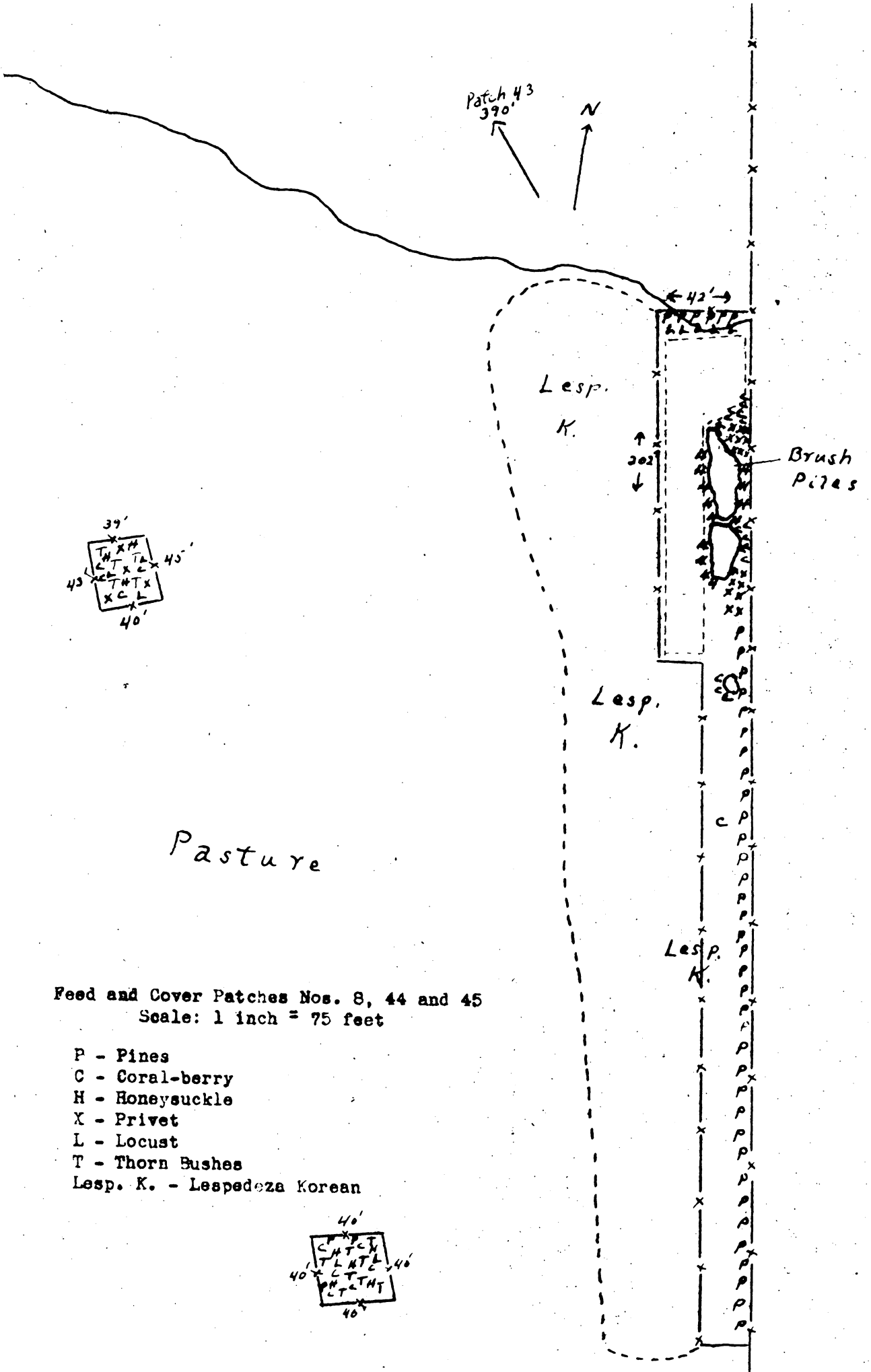
26	steel posts - .3145 each	$ 8.18
12½	locust posts - 25¢ each	3.12
1702	feet of barb wire	3.13
	Staples and nails	.10
	Labor fencing - 7 hours	1.75
	Reinforcing fence - 1/2 hour	.13

Planting (1936)

	Discing for buckwheat - 1 hour	.80
11	pounds of buckwheat - 2.4¢ pound ...	.26
	Sowing buckwheat - 1/3 hour	.08
	Discing for Korean Lespedeza - 1 hr.	1.00
40	pounds Korean Lespedeza - 6¢ pound .	2.40
	Sowing Korean Lespedeza - 1¼ hour ..	.32
12	Pines - April 1936	
15	Locust - April 1936 - 1 hour for both	.25
40	pounds 4-12-4 fertilizer	.48

Planting (1937)

16	coralberries - March 1937	
31	honeysuckle - March 1937 - 1 hour ..	.25
23	Privet - March 30, 1937 3/4 hour ...	.18
7	Locust - March 30, 1937	
43	Pines - March 29, 1937 - 1 hour	.25
	Total	$22.68



Feed and Cover Patches Nos. 8, 44 and 45
Scale: 1 inch = 75 feet

P - Pines
C - Coral-berry
H - Honeysuckle
X - Privet
L - Locust
T - Thorn Bushes
Lesp. K. - Lespedeza Korean

Feed and Cover Patches Nos. 9 and 10:

These patches were located on a line fence between two large pasture fields. The fence had no brush or weeds along it. The pasture field on the Smithfield land was pastured unusually heavily. The idea was to develop cover along the line fence in order to enduce quail out into the pastures. The drought in May and June prevented preparing the land early, therefore, these patches were disced July 10, 1936 and sown to buckwheat. These patches did not do as well as the previous ones referred to. There is no record of quail using them and very few doves used them. There is no record of the upland plover that used these pastures ever feeding in any of the patches on the demonstration area.

Pines, privets, thorn bushes, coralberries, honeysuckle and locust were planted to provide cover. Most of the pines, locust and thorn bushes were planted on the windward side to act as a **windbreak.** The privet and coralberry were planted around it as well as along the east end of the line fence inside of the enclosed area. The pines and locust planted in 1936 were disced up by mistake.

The fences had three strands of 4-barbed cattle wire and the steel posts were braced with steel posts. The cattle were excluded entirely.

Cost of Feed and Cover Patch No. 9:

Fencing:

12	steel posts - .3145 each	$ 3.77
5½	locust posts - 25¢ each	1.37
227	feet barb wire (x3 strands)	1.25
	Staples and nails .....1.....	.05
	Labor - fencing 3½ hours	.88
	Reinforcing fence - 1/2 hour	.12

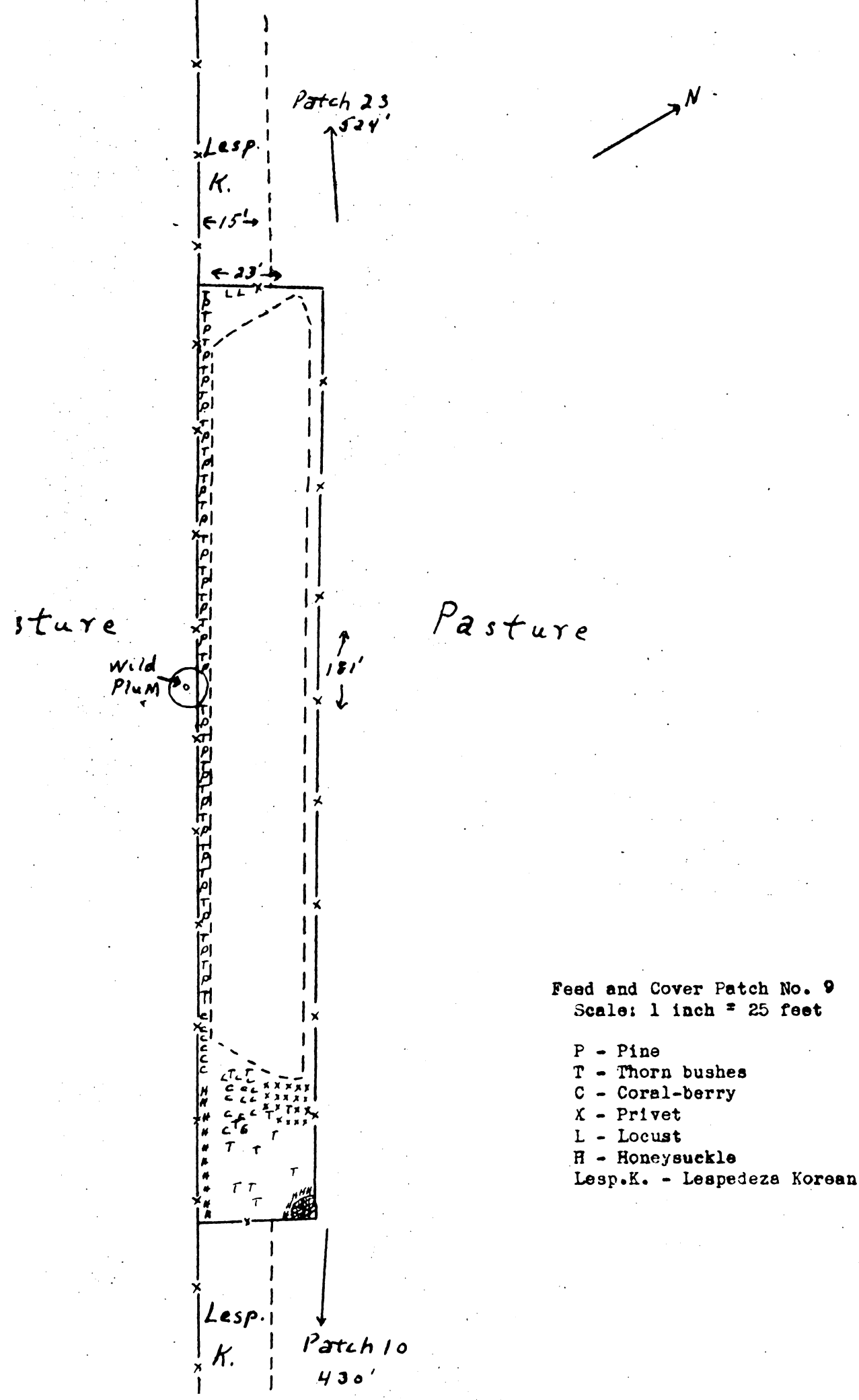
Cost of Feed and Cover Patch No. 9 (Continued)

Planting (1936)

	Discing for Korean lespedeza - 1/2 hour	$ .50
	Sowing Korean Lespedeza - 1/2 hour.....	.13
14	pounds Korean Lespedeza - 6¢ pound.....	.84
	Discing for buckwheat - 3/4 hour.....	.75
	Sowing buckwheat - 1/2 hour	.12
11	pounds buckwheat 2.4¢ each	.26
8	Pines March 31, 1936 - none lived	
10	Locust " " " - " " - 1/3 hr.	.08
35	pounds 4-12-4 fertilizer	.42

Planting (1937)

23	Pines	
2	Locust	
20	Coralberries	
18	Privet	
15	honeysuckle	
37	Thornbushes - 1¾ hrs. - last of March	.43
	Total	$10.97



Feed and Cover Patch No. 9
Scale: 1 inch = 25 feet

P - Pine
T - Thorn bushes
C - Coral-berry
X - Privet
L - Locust
H - Honeysuckle
Lesp.K. - Lespedeza Korean

Cost of Feed and Cover Patch No. 10:

Fencing

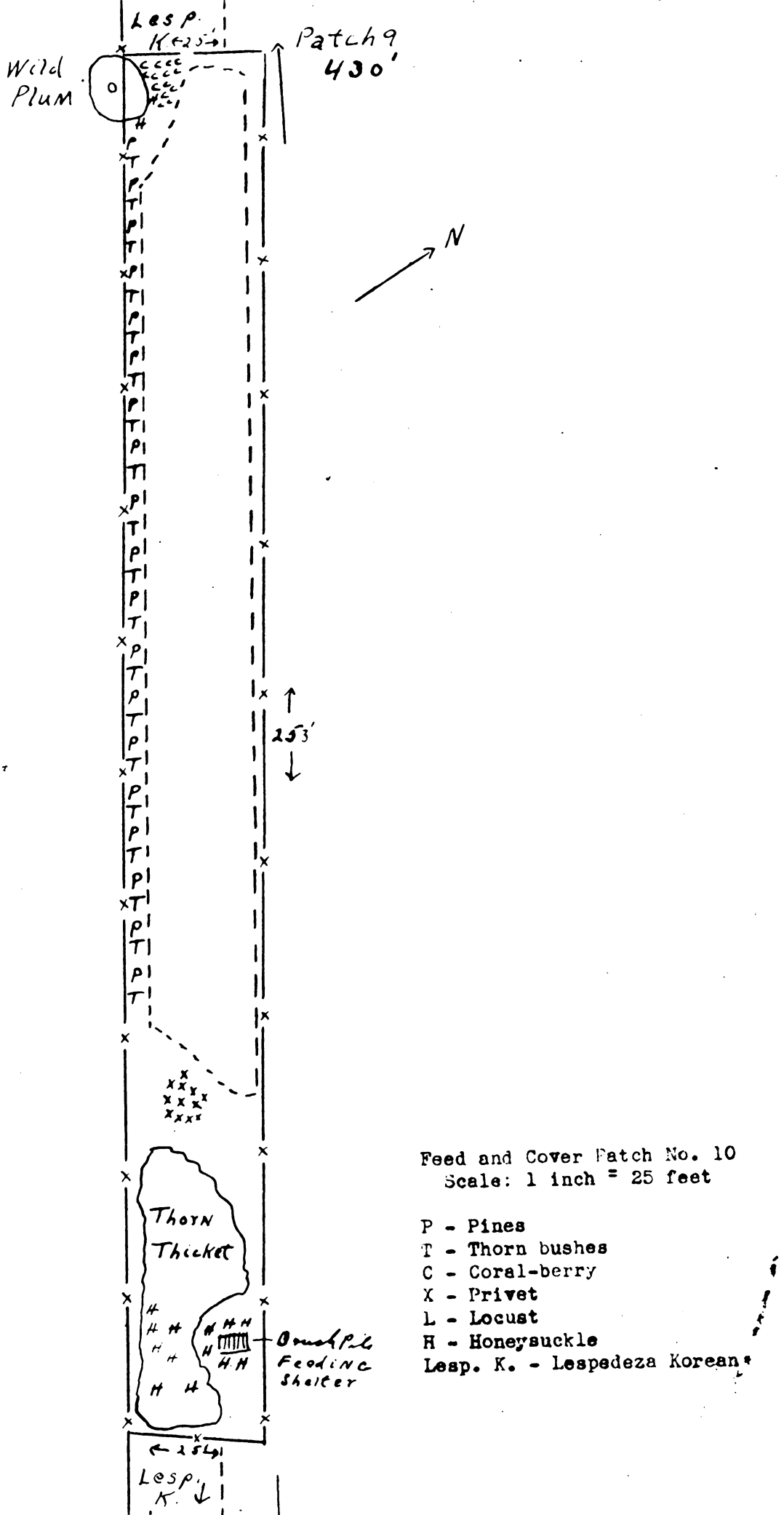
17	steel posts - .3145 each	$ 5.31
6	locust posts - 25¢ each	1.50
303	feet barb wire (x3 strands)	1.67
	Staples and nails	.06
	Labor fencing - 5 hours	1.25
	Reinforcing fence - 1/2 hour	.13

Planting (1936)

	Discing for Korean Lespedeza - 1/2 hr.	.50
	Sowing Korean Lespedeza - 1/2 hr.	.13
14	pounds Korean Lespedeza - 6¢ pound ...	.84
	Discing for buckwheat	.80
	Sowing buckwheat - 1/2 hr.	.13
11	pounds buckwheat - 2.4¢ pound	.26
35	pounds 4-12-4 fertilizer.....	.42
12	Pines (none lived)	
12	Locust (none lived) - 1/2 hr.	.12

Planting (1937)

17	Pines	
12	Privet	
2	Locust	
22	Coralberry	
14	Honeysuckle	
41	Thornbushes - Late March - 1½ hrs. ...	.37
	Total	$13.49



Feed and Cover Patch No. 10
Scale: 1 inch = 25 feet

P - Pines
T - Thorn bushes
C - Coral-berry
X - Privet
L - Locust
H - Honeysuckle
Lesp. K. - Lespedeza Korean

Feed and Cover Patches Nos. 11, 12, 13, 14, 15, 18, 19, 20 and 22:

All of the above mentioned patches are similar in almost every respect. They are all located in the same three hundred acre pasture field and none are near any woods or uncultivated fields. The purpose for putting these patches in the pasture was to determine if it was possible to get quail to use large open pastures. The patches were located in such a way as to enclose what native shrubs, and bushes as were growing in the field, and all but two (Nos. 11 and 14) had a clump of those bushes.

Korean lespedeza was sown in an unfenced plot adjacent to the feed patches except patch No. 20. The ground was disced on April 15, 1936 and the lespedeza was sown the same day. This pasture was not heavily pastured, but sheep, cattle and horses used it most of the pasture season. All of the lespedeza patches did well, and it is thought that they will reseed themselves properly.

On May 11, 1936 the patches were plowed and disced with a tractor, and on May 16 they were sown to kaffir corn, brabham cowpeas, German Tennessee millet and sudan grass at the rate of approximately 62 pounds per acre. That rate per acre is entirely too high if seed production is the major consideration, but since cover was of major consideration instead, it was thought necessary. In June it was realized that the plants were too thick to develop even good cover, therefore, approximately one-tenth of the plants in each patch were chopped out with a hoe. None of the patches received any cultivation other than this. At the time of sowing, approximately 35 pounds of 4-12-4 commercial fertilizer was sown with the use of the drill. This was at a rate of approximately 200 pounds per acre.

The plants made a good growth, but did not produce a large yield of seeds. However, the yield of seeds was sufficient. The seeds remained on most of the plants fairly well. Since the plants were unusually thick they more or less formed a mat and helped to hold each other off the ground, thereby aiding in keeping the seed head from falling on the ground.

Along the outside edge for a width of two feet all around the patch lespedeza was sprouting, and it appeared as if there will be a good stand in 1937. The lespedeza did not produce very many seeds in 1936.

Since cover was considered the major factor, pines, locust, privet, coralberry, honeysuckle and thornbushes were planted to develop cover in a few years. The pines and locust were planted on the windward side to produce a windbreak. The privet and coralberrys were planted in groups to provide fruit. The honeysuckle was planted in corners of the fence and among the natural thorn thickets in each corner.

A covey of fourteen quail used patch No. 12 almost continuously from late August through early October. Where they went or what became of them is unknown.

Four quail used feed patches Nos. 13 and 20 from late December until the middle of February. One bird at a time disappeared during January and early February until the middle of February at which time there was only one bird left. The cause was unknown.

A covey of fifteen birds used the patch No. 18 during December. On December 12 a cock bird with a broken wing and a cut thigh was captured by hand in the patch and taken to the office and kept with a captivity reared cock. In March both birds were released on Joe Rud's farm in Roanoke Valley. The covey of 14 was seen again in the patch in early January. They were not

seen again, but it is thought that they moved to an area back of the airport. The cover was better there.

No birds were seen in any of the other patches except patch No. 11. On May 17, 1937, a cock and hen quail were seen feeding on a millet head in that patch. Quail had broken covey for the nesting season at that time, therefore they may have been mated birds.

Cost of Feed and Cover Patch No. 11:

Fencing

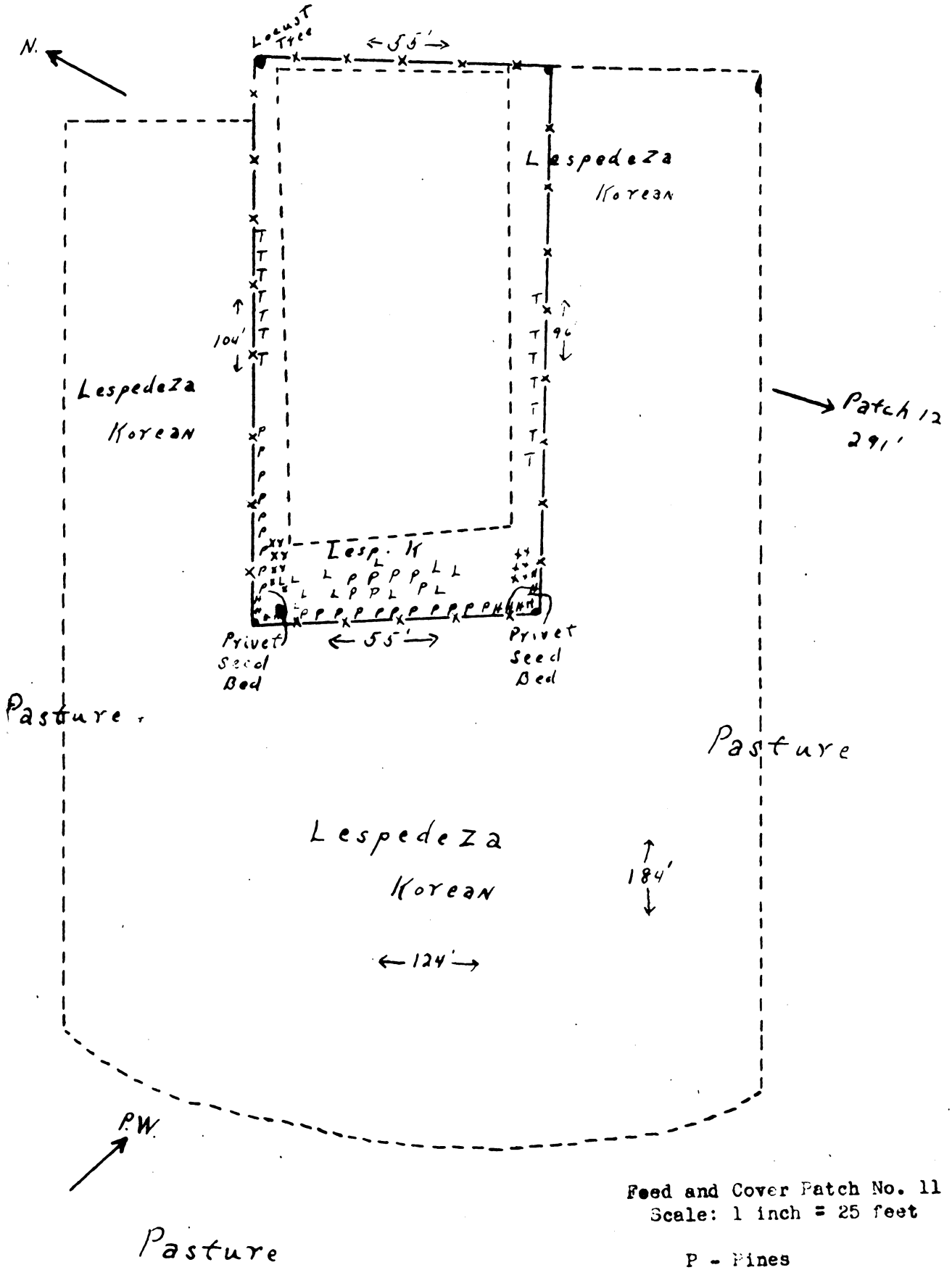
18	steel posts - .3145 each	$ 5.56
6	Locust posts - 25¢ each	1.50
311	feet woven wire	4.24
311	feet barb wire	.57
	Staples and nails	.05
	Labor fencing - 13 hrs. (2 posts pulled out)	3.25

Planting (1936)

	Discing for Korean lespedeza - 1 hr...	1.00
	Sowing Korean lespedeza - 3/4 hr.....	.18
13	Pounds of Korean lespedeza - 6¢ pound	.78
	Plowing and discing for feed patch $\frac{3}{4}$ hr.	.75
	Sowing seeds - 1/2 hour	.40
	Seeds - Kaffir corn, brabham cowpeas, German Tennessee millet, sudan grass, and lespedeza sericia	.50
35	Pounds 4-12-4 fertilizer	.42
9	Pines - April 1936	
12	Locust - April 1936	
2	Privet seed beds in west corner - $1\frac{1}{2}$ hr.	.37

Planting (1937)

16	Pines	
14	Privet	
14	Thornbushes - 3/4 hour	.18
	Total	$19.75



Feed and Cover Patch No. 11
Scale: 1 inch = 25 feet

P - Pines
L - Locust
T - Thorn bushes
X - Privet
H - Honeysuckle

Cost of Feed and Cover Patch No. 12:

Fencing

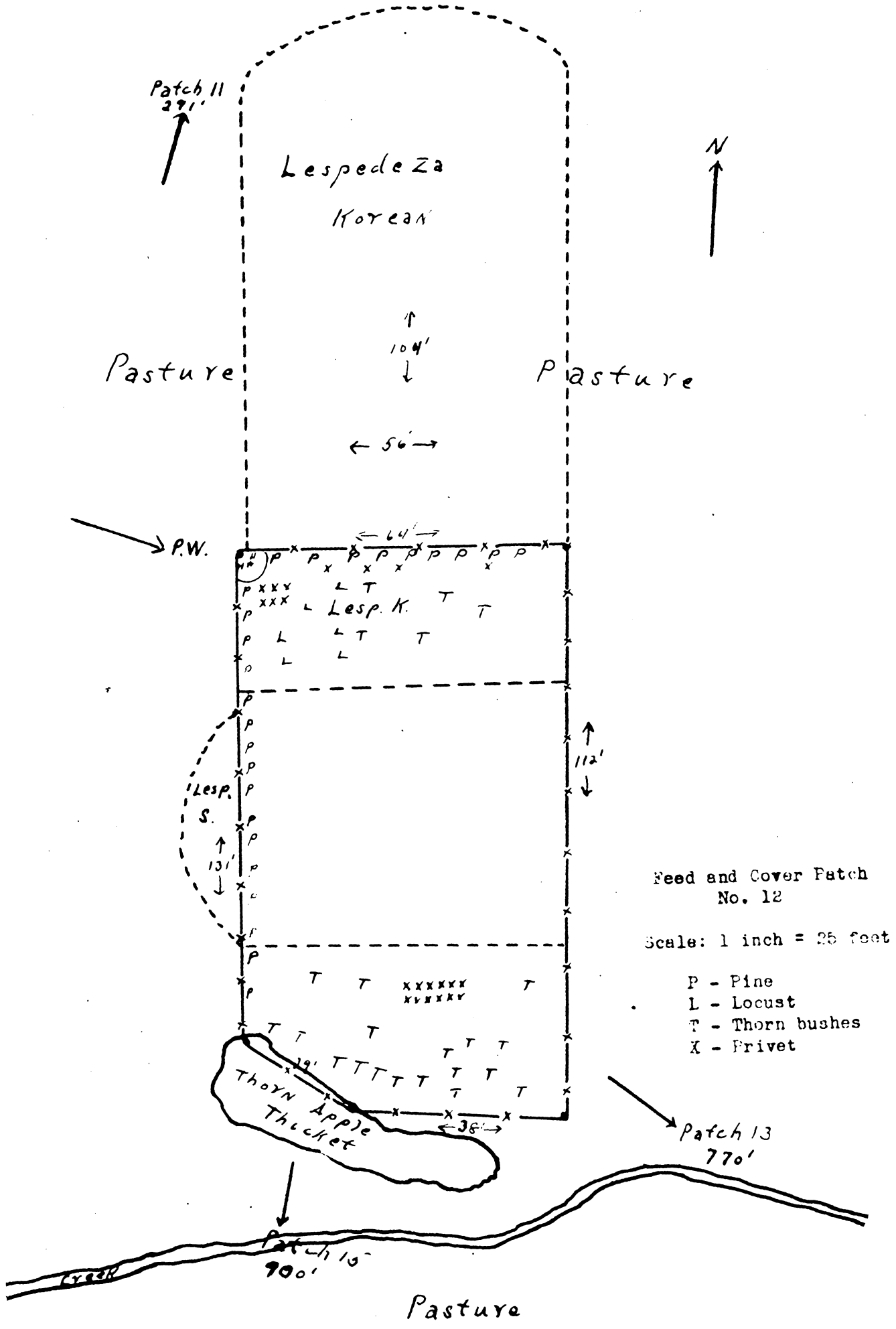
21 steel posts - .3145 each	$ 6.60
374 feet woven wire	5.10
374 feet barb wire	.69
Staples and nails	.10
Labor fencing - 11 hrs. (1 post pulled out)	2.75

Planting (1936)

Discing for Korean lespedeza - 1/2 hr.	.50
Sowing Korean lespedeza - 1/2 hr.	.13
5½ pounds Korean lespedeza - 6¢ pound ...	.33
Plowing and discing - 3/4 hr. - 5/11/36	.75
Seeds - Kaffir corn, hrabham cowpeas, German Tennessee millet, sudan grass, and lespedeza serécia	.50
Sowing seeds - 1/2 hour	.40
35 pounds 4-12-4 fertilizer	.42
8 Locust - April	
15 Pines - April	
1 Privet seed bed - April - 1½ hrs.	.38
16 Honeysuckle - August	

Planting (1937)

19 Pines - 3/31/37	
4 Locust "	
18 Privet " - 1/2 hour	.13
Total	$18.28


Patch 11
291'
Lespedeza
Korean
N
104'
Pasture
Pasture
56'
P.W.
64'
Lesp. K.
Lesp. S.
131'
112'
Thorn Apple Thicket
19'
38'
Patch 13
770'
Patch 10
900'
Creek
Pasture
Feed and Cover Patch
No. 12
Scale: 1 inch = 25 feet
P - Pine
L - Locust
T - Thorn bushes
X - Privet

Cost of Feed and Cover Patch No. 13:

Fencing

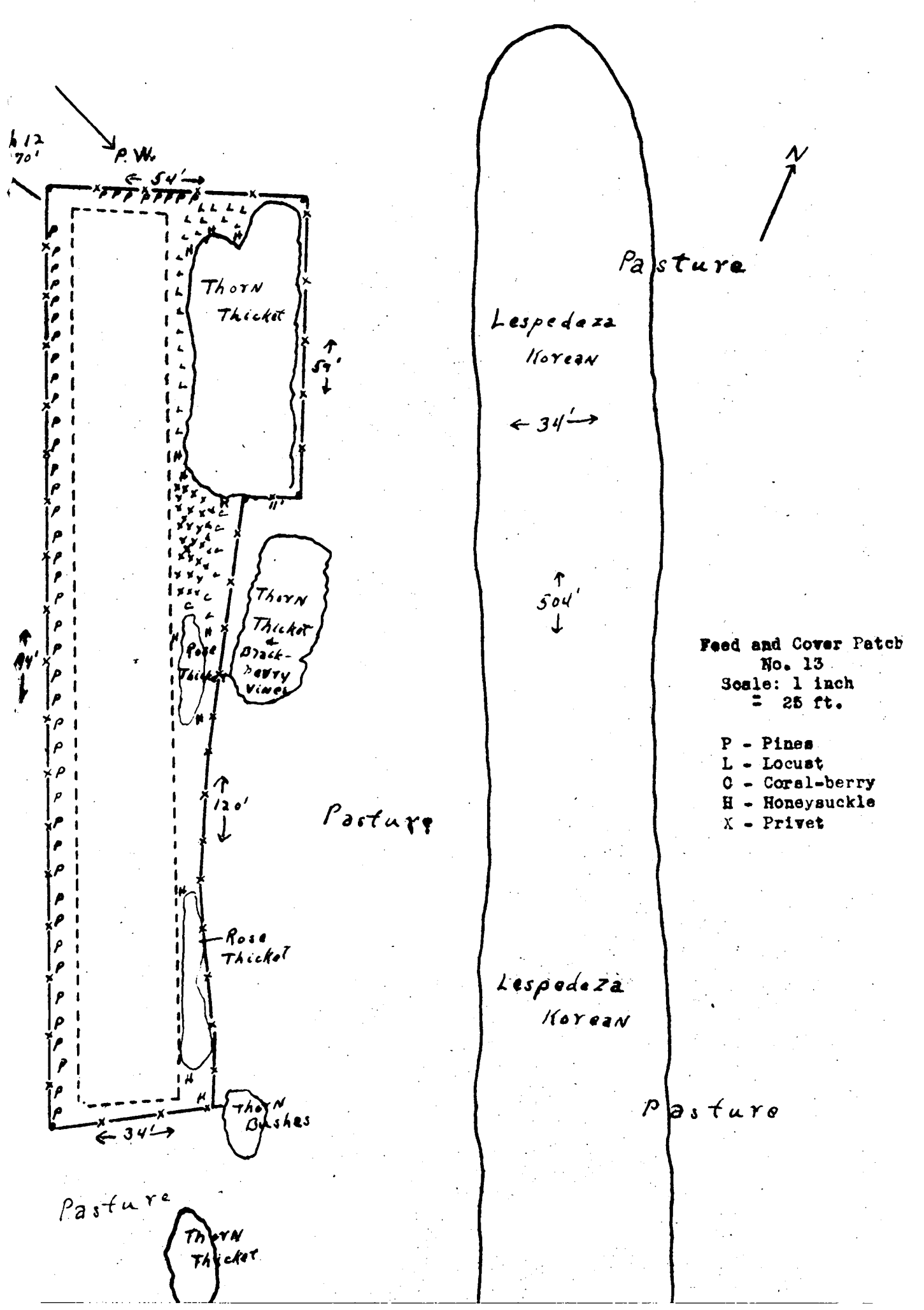
30	steel posts - .3145.....	$ 9.44
17	Locust posts - 25¢ each	4.25
420	feet woven wire	5.72
420	feet barb wire	.77
	Staples and nails	.10
	Labor fencing - 7 hrs.	1.75

Planting (1936)

	Discing for Korean Lespedeza - 3/4 hr.	.75
	Sowing Korean Lespedeza - 1/2 hr. ...	.13
13½	pounds of Korean lespedeza - 6¢ pound	.80
	Discing and plowing - ¾ hr - 5/12/36	.75
	Sowing seeds - 1 hr. - 5/16/36	.40
	Seeds - Kaffir corn, brabham cowpeas, German Tennessee Millet, Sudan grass and lespedeza serecia	.60
35	pounds 4-12-4 fertilizer	.42
14	Honeysuckles - August - 1/2 hr.	.12

Planting (1937)

54	Pines 3/30/37	
30	Locust "	
43	Privet "	
15	Honeysuckle 3/27/37 - 1 hour	.12
	Total	$26.12


P. W.
54'
Thorn Thicket
59'
11'
Thorn Thicket & Black-berry vines
Rose Thicket
44'
120'
Pasture
Rose Thicket
Thorn Bushes
34'
Pasture
Thorn Thicket
Pasture
Lespedeza Korean
34'
504'
Lespedeza Korean
Pasture
N
Feed and Cover Patch
No. 13
Scale: 1 inch
= 25 ft.
P - Pines
L - Locust
C - Coral-berry
H - Honeysuckle
X - Privet

Cost of Feed and Cover Patch No. 14:

Fencing

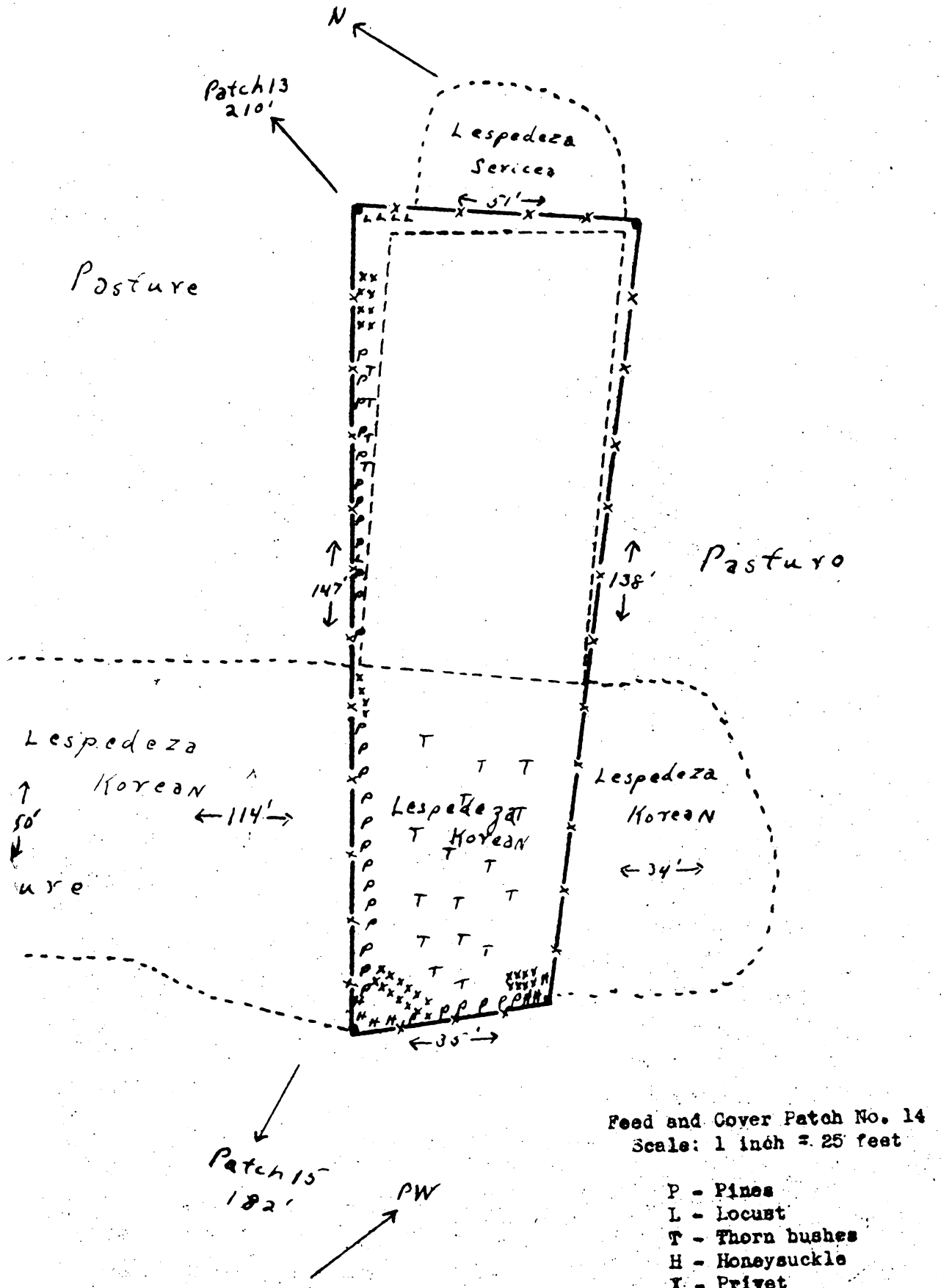
20	Steel posts - .3145 each	$ 6.29
11	Locust posts - 25¢ each	2.75
372	feet woven wire	5.07
372	feet barb wire	.68
	Staples and nails	.10
	Labor fencing - 6 hours	1.50

Planting (1936)

	Discing for Korean lespedeza - 1/2 hr...	.50
	Sowing Korean lespedeza - 1/2 hr.	.12
6	Pounds Korean lespedeza - 6¢ pound	.36
	Plowing and discing - 5/12/36 - 3/4 hr..	.75
	Sowing seeds - 5/16/36 - 1/2 hr.	.40
	Seeds - Kaffir corn, brabham cowpeas, German Tennessee millet, sudan grass, and lespedeza sericia	.60
35	pounds 4-12-4 fertilizer	.42
16	honeysuckle - August - 1/2 hr.	.13

Planting (1937)

39	Pines	
7	Locust	
32	Privet - 3/30/37 - 3/4 hr.	.18
	Total	$19.85



Feed and Cover Patch No. 14
Scale: 1 inch = 25 feet

P - Pines
L - Locust
T - Thorn bushes
H - Honeysuckle
X - Privet

Cost of Feed and Cover Patch No. 15:

Fencing

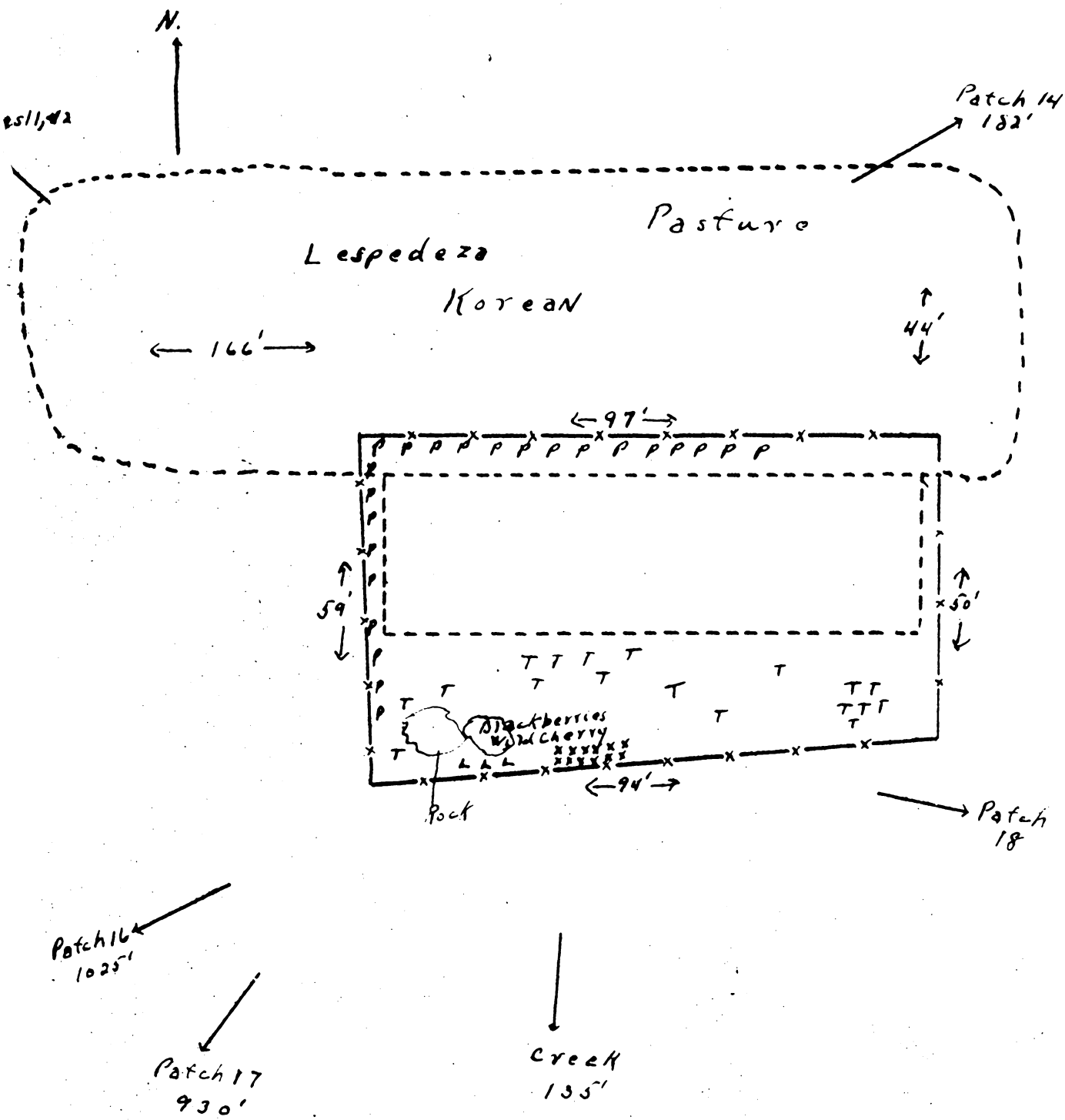
19	steel posts - .3145 each	$ 5.97
9	locust posts - 25¢ each	2.25
300	feet of woven wire	4.09
300	feet of barb wire	.55
	Staples and nails	.10
	Labor for fencing - 5 hrs.	1.25

Planting (1936)

	Discing for Korean Lespedeza - 1/2 hr.	.50
	Sowing Korean Lespedeza - 1/2 hr.	.12
5	Pounds of Korean Lespedeza - 6¢ pound	.30
	Plowing and discing - 3/4 hr.	.75
	Sowing seeds - 1/2 hr.	.40
	Seeds - Kaffir corn, brabham cowpeas, German Tennessee millet, Sudan grass, and lespedeza serecia	.55
35	pounds 4-12-4 fertilizer	.42

Planting (1937)

21	Pines	3/31/37	
3	locust	"	
20	Privet	" 1/2 hr. for all	.13
		Total	$17.38



Feed and Cover Patch No. 15
Scale: 1 inch = 25 feet

P - Pines
L - Locust
T - Thorn Bushes
X Privet

Cost of Feed and Cover Patch No. 18:

Fencing

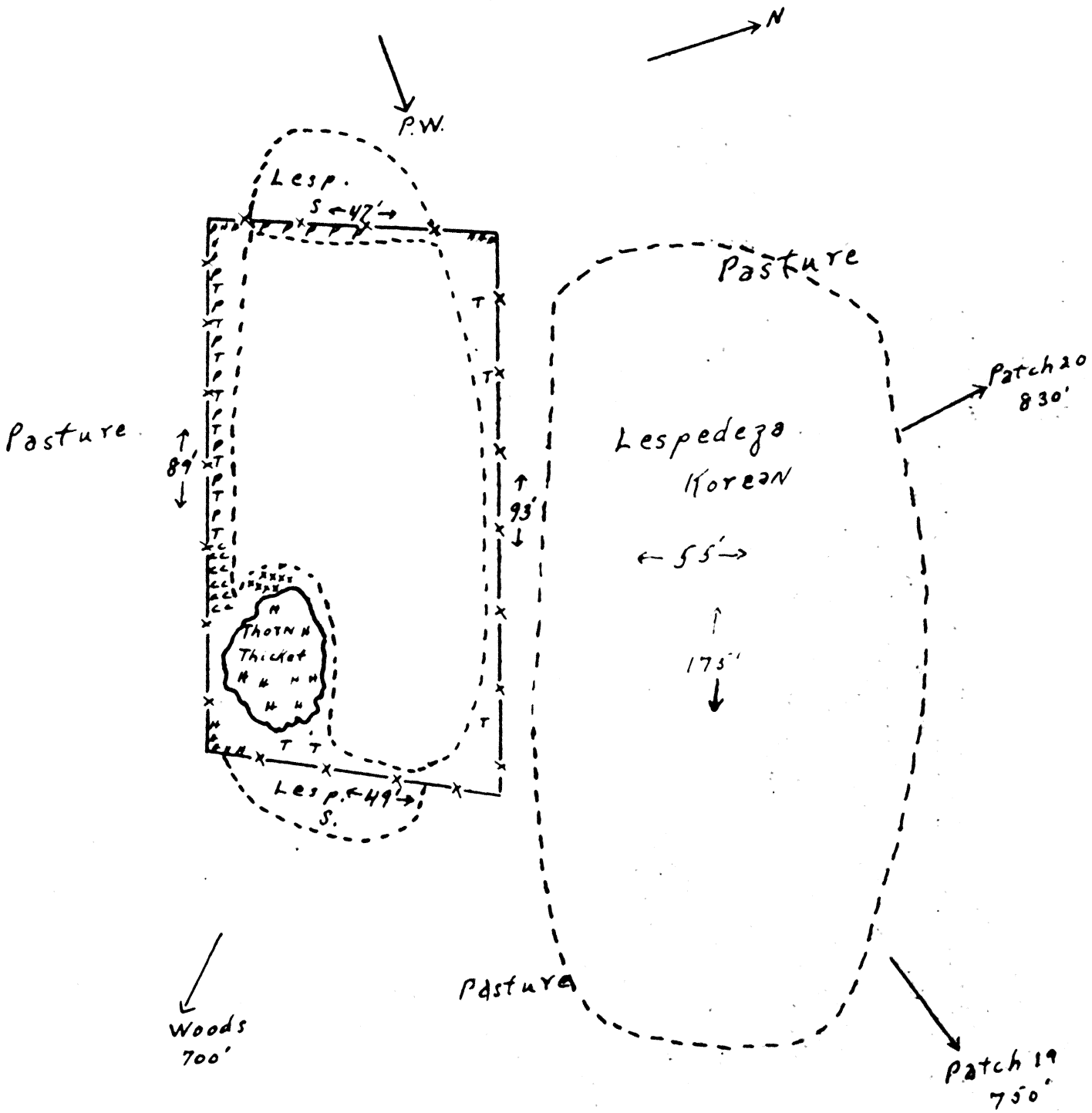
18	Steel posts - .3145 each	$ 5.56
8	locust posts - 25¢ each	2.00
240	feet of woven wire	3.27
240	feet of barb wire	.44
	Staples and nails	.10
	Labor for fencing - 8 hrs.	2.00

Planting (1936)

	Discing for Korean lespedeza - 1/2 hr.	.50
	Sowing Korean lespedeza - 1/2 hr.	.12
6½	pounds of Korean lespedeza - 6¢ pound	.39
	Plowing and discing - 5/11/36 - 3/4 hr.	.75
	Sowing seeds - 5/16/36 - 1/2 hr.	.40
	Seeds - Kaffir corn, brabham cowpeas, German Tennessee millet, Sudan grass, and lespedeza sericia.....	.60
35	pounds 4-12-4 fertilizer - 5/16/36	.42
12	Honeysuckle - August - 1 hour	.25

Planting (1937)

11	Coralberry	3/24/37		
24	Honeysuckle	"		
22	Thornbushes	"	1 hour for all ...	.25
4	Locust	3/31/37		
16	Pines	"	1/4 hour for both	.06
			Total	$17.11



Feed and Cover Patch No. 18
Scale: 1 inch = 25 feet

P - Pines
H - Honeysuckle
L - Locust
T - Thorn brush
C - Coral-berry
Lesp. S. - Lespedeza Sericea

Cost of Feed and Cover Patch No. 19:

Fencing

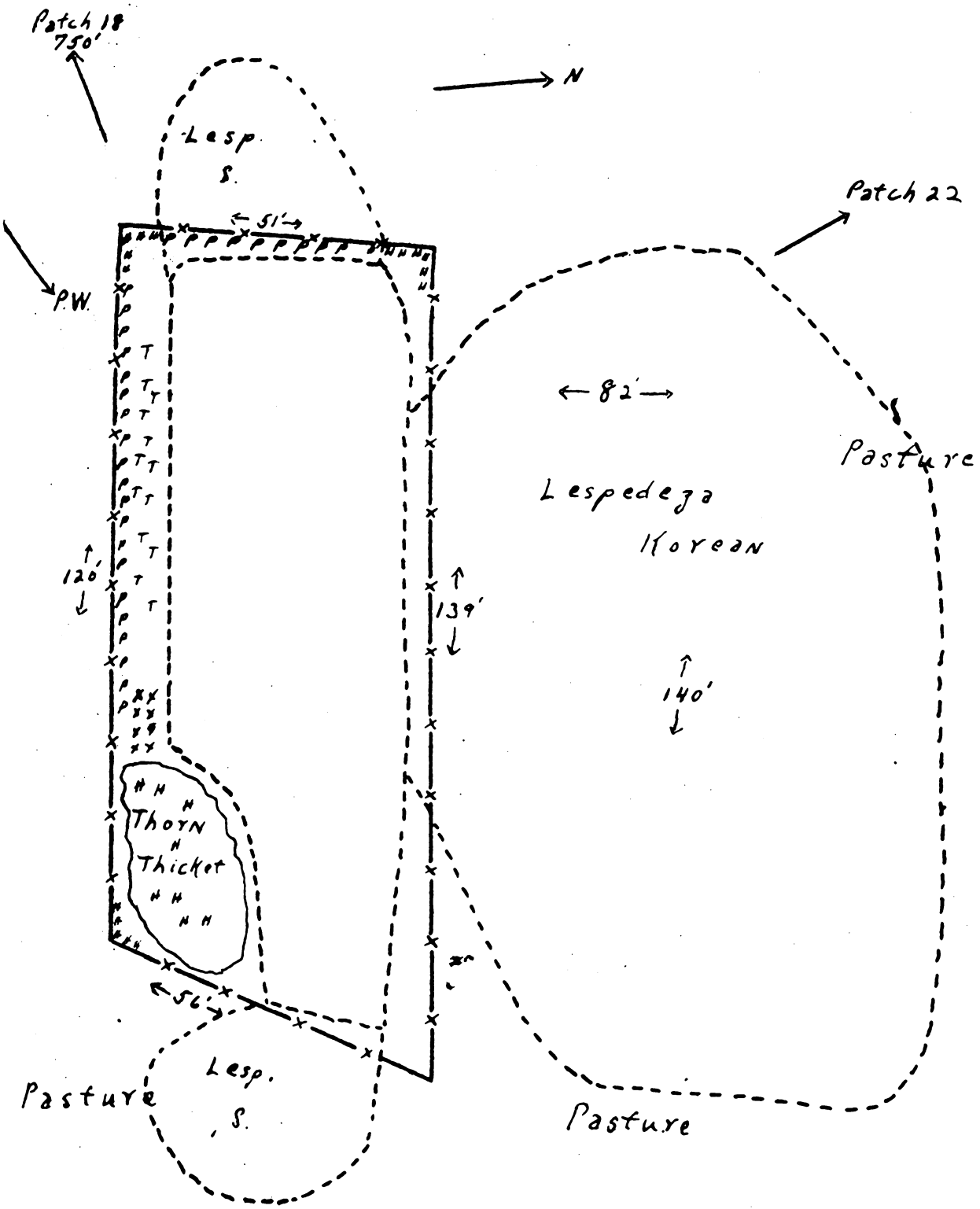
18	Steel posts - .3145 each	$ 5.56
8½	Locust posts - 25¢ each	2.12
366	feet of woven wire	4.88
366	feet of barb wire	.67
	Staples and nails	.10
	Labor fencing - 8 hours	2.00

Planting (1936)

	Discing for Korean Lespedeza - 1/2 hr.	.50
	Sowing Korean lespedeza - 1/2 hr.	.12
5	pounds of Korean Lespedeza - 6¢ pound	.30
	Plowing and discing - 5/11/36 - 3/4 hr.	.75
	Sowing seeds - 5/16/36 - 1/2 hour	.40
	Seeds - Kaffir corn, brabham cowpeas, German Tennessee millet, Sudan grass, lespedeza sericia	.60
35	pounds 4-12-4 fertilizer	.42
12	Honeysuckle - August - 1 hour	.25

Planting (1937)

10	Honeysuckle	
6	Thornbushes	
12	Coralberry	
18	Pine	
4	Locust - 1 hour for all - April 1937	.25
	Total	$18.92



Feed and Cover Patch No. 19
Scale: 1 inch = 25 feet

P - Pines
H - Honeysuckle
T - Thorn bushes
X - Privet
Lesp. S. - Lespedeza Sericea

Cost of Feed and Cover Patch No. 20:

Fencing

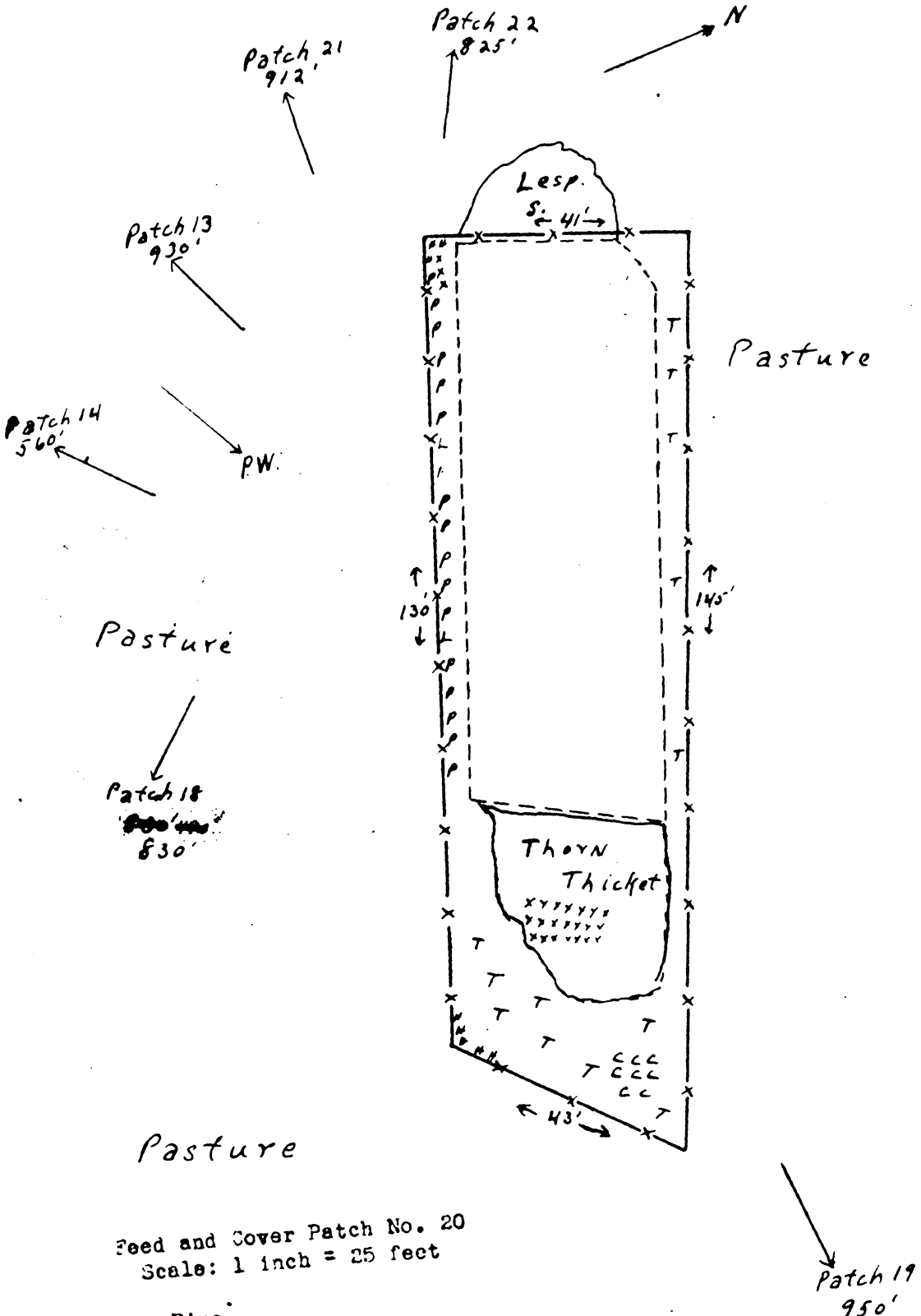
20 Steel Posts - .3145 each	$ 6.29
9 Locust Posts - 25¢ each	2.25
360 feet woven wire	4.91
360 feet barb wire	.66
Staples and nails	.08
Labor fencing - 6½ hours	1.62

Plantings (1936)

Plowing and Discing - 5/11/36 - 3/4 hr.	.75
Sowing seeds - 1/2 hour	.40
Seeds - Kaffir corn, brabham cowpeas, German Tennessee millet, Sudan grass, and lespedeza serecia	.60
24 Honeysuckles - August - 1/2 hour	.13
35 pounds of 4-12-4 fertilizer	.42
No lespedeza plantings made	

Plantings (1937)

18 Pines	
2 Locust	
8 Coralberry	
24 Privet - April 1937 - 1/2 hour for all	.12
Total	$18.23



Feed and Cover Patch No. 20
Scale: 1 inch = 25 feet

P - Pine
C - Coral-berry
T - Thorn bush
X - Privet
L - Locust
H - Honeysuckle
Lesp. S. - Lespedeza Sericea

Cost of Feed and Cover Patch No. 22:

Fencing

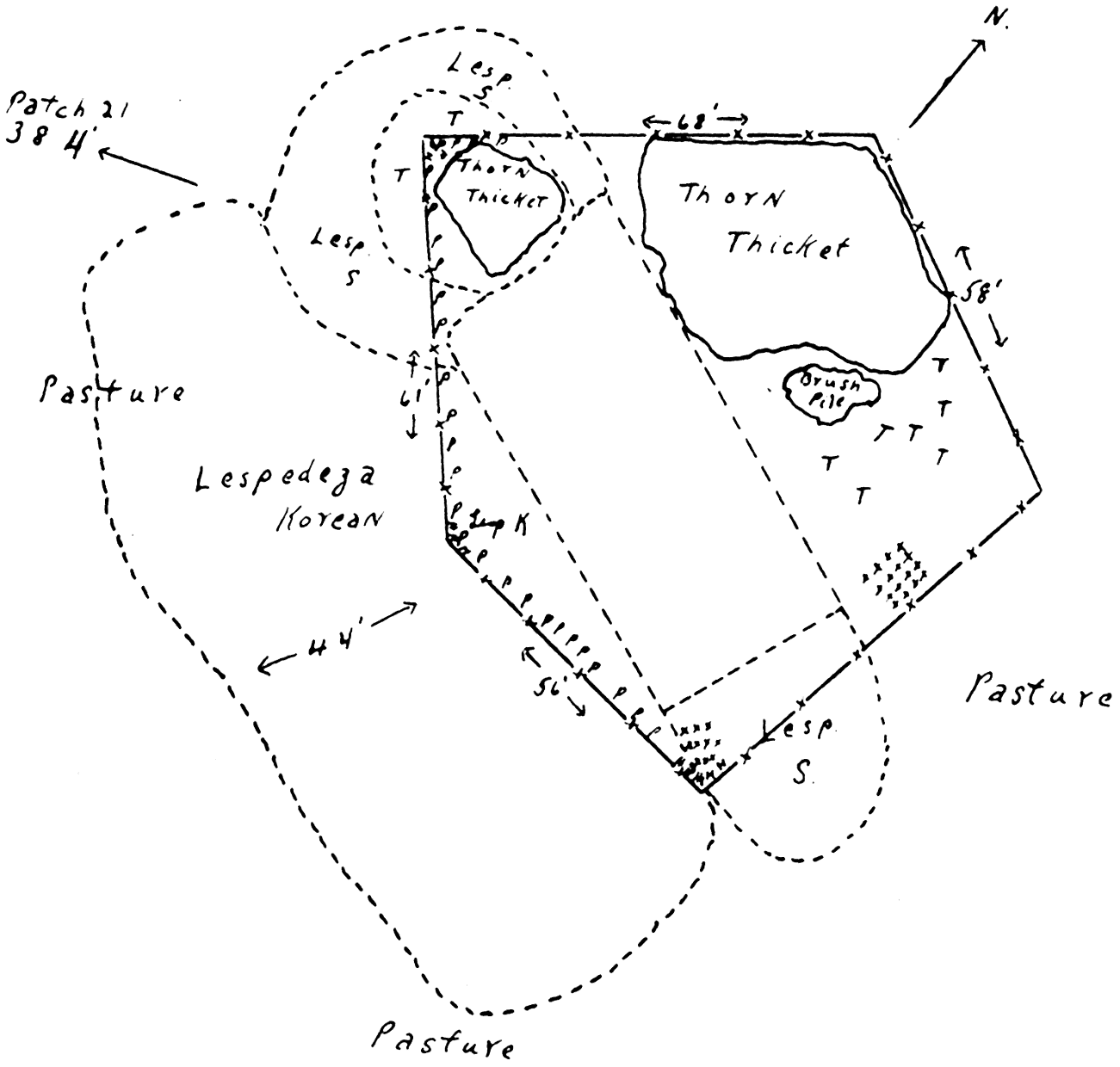
18 Steel Posts - .3145 each.....	$ 5.66
9½ Locust Posts - 25¢ each	2.37
315 feet of woven wire	4.29
315 feet of barb wire	.58
Staples and nails	.10
Labor fencing - 5½ hours	1.37

Planting (1936)

Discing for Korean Lespedeza - 1/2 hr.	.50
Sowing Korean Lespedeza - 1/2 hour ...	.13
4½ pounds of Korean lespedeza	.27
Plowing and discing - 1/2 hour	.50
Sowing seeds - 1/2 hour	.40
Seeds - Kaffir corn, brabham cowpeas, German Tennessee millet, Sudan grass, and lespedeza serecia	.60
35 pounds of 4-12-4 fertilizer	.42
18 Honeysuckle - 1/2 hour	.12

Planting (1937)

22 Pines 26 Privet 6 Locust - April 1937 - 1/2 hour for all	.13
Total	$17.44



Feed and Cover Patch No. 22
Scale: 1 inch = 25 feet

P - Pine
H - Honeysuckle
T - Thorn bushes
X - Privet
Lesp. S. - Lespedeza Sericea
Lesp. K. - Lespedeza Korean

Feed and Cover Patches No. 16 and 17.

These two patches are adjacent to woods that have an abundance of wild grape vines, Virginia creeper, flowering dogwood, a few pines, and wild plums. There was an extreme shortage of suitable cover in this woods and also the pastures. Both patches had Korean lespedeza plantings of which part are enclosed by the feed patch fences. The lespedeza in the pasture was grazed much heavier than those referred to in patches Nos. 11, 12, 13, 14, 15 and 18. Although it was grazed considerably it is thought that it will reseed itself.

Both of these patches were plowed, and disced May 11, 1936, and had 4-12-4 fertilizer applied at the rate of approximately 200 pounds per acre at the same time that the Kaffir corn, brabham cowpeas, German Tennessee millet, and Sudan grass was drilled in with a wheat drill which was May 16, 1936. The seeds were sown at the rate of approximately 70 pounds per acre. About one-tenth of the plants were chopped out with a hoe because they were too thick. The chopping done while thinning was the only cultivation given. The plants did not do as well as in patches Nos. 11, 12, 13, 14, 15 and 18. Possibly this was due to the effects of the trees nearby.

Pines and privet were the only shrubs planted in the patches. The pines were planted to serve as a wind break, and the privet to furnish additional fruit. It was advisable not to plant honeysuckle so close to the woods because of the danger of its spreading, therefore none was planted.

There is no record of quail using either of these patches. Several doves used the patch the entire winter and spring.

Cost of Feed and Cover Patch No. 16:

Fencing

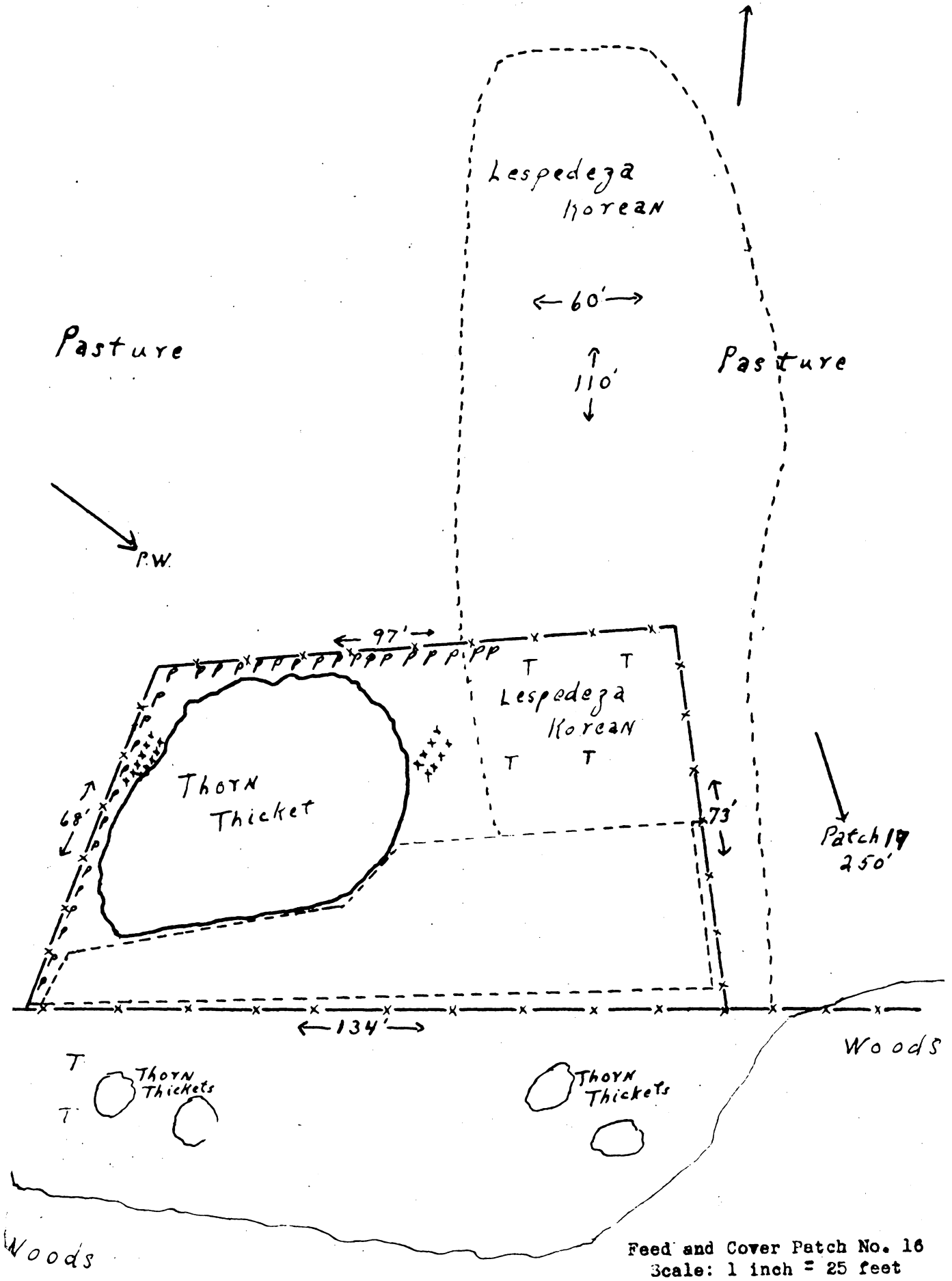
9	steel posts - .3145 each	$ 2.83
9	locust posts - 25¢ each	2.25
238	feet of woven wire	3.24
238	feet of barb wire	.45
	Staples and nails	.10
	Labor fencing - 3 hours	.75

Planting (1936)

	Discing for Korean lespedeza - 4/15/36 1/2 hour ...	.50
	Sowing Korean lespedeza 4/15/36 - ½ hr.	.12
5	pounds of Korean lespedeza - 6¢ pound .	.30
	Plowing and discing - 5/11/36 - 3/4 hr.	.75
	Sowing seeds - 5/11/36 - 1/2 hour	.40
	Seeds - Kaffir corn, brabham cowpeas, German Tennessee millet, Sudan grass and lespedeza sericea.....	.55
35	Pounds 4-12-4 fertilizer	.42

Plantings (1937)

23	Pines	
20	Privet 3/31/37 - 1/2 hour for all	.13
	Total	$12.79



Feed and Cover Patch No. 16
Scale: 1 inch = 25 feet

P - Pines
X - Privet
T - Thorn Bush

Cost of Feed and Cover Patch No. 17:

Fencing

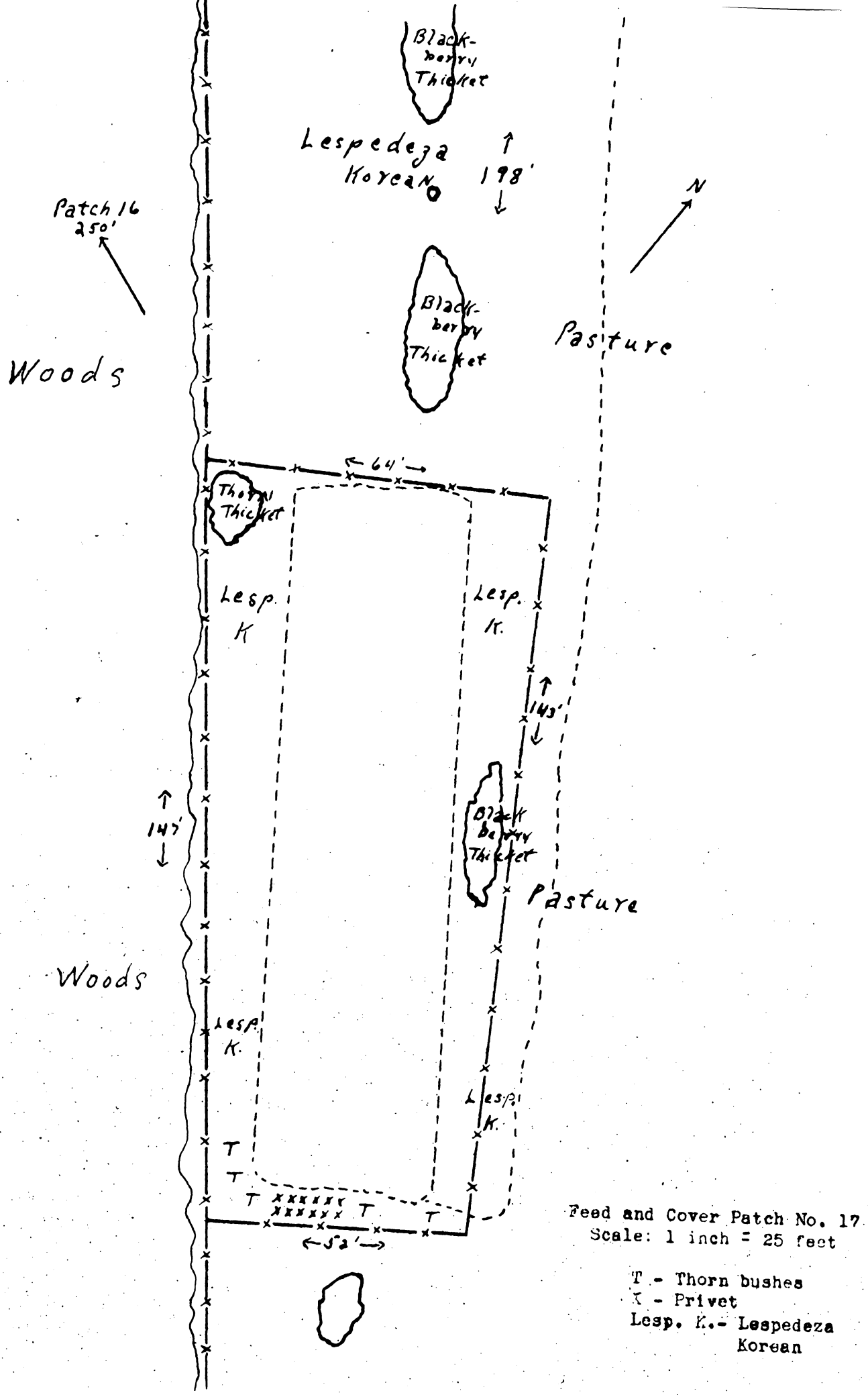
9	Steel Posts - .3145 each	$ 2.72
10	locust posts - 25¢ each	2.50
260	feet of woven wire	3.34
260	feet of barb wire	.49
	Staples and nails	.10
	Labor for fencing - 4½ hours	1.12

Planting (1936)

	Discing for Korean lespedeza - 4/15/36 1/2 hour ..	.50
	Sowing Korean lespedeza - 4/15/36 - ½ hr.	.13
11	Pounds of Korean lespedeza - 6¢ pound	.66
	Plowing and discing - 1 hr. - 5/11/36	1.00
	Sowing seeds - 1/2 hr. - 5/16/36	.40
	Seeds - Kaffir corn, brabham cowpeas, Sudan grass, German Tennessee millet, and lespedeza sericea	.60
35	Pounds 4-12-4 fertilizer	.42

Planting (1937)

12	Privet - 1/4 hour	.06
	Total	$14.04



Feed and Cover Patch No. 17
Scale: 1 inch = 25 feet

T - Thorn bushes
X - Privet
Lesp. K.- Lespedeza Korean

Feed and Cover Patch No. 21.

This is in a pasture and is close to a small park-like woods. Inside of the enclosed area of the feed patch is a fairly dense blackberry thicket. The cattle use the woods as a resting place during the middle of the day, therefore, there was an extreme shortage of cover in the pasture field and also in the woods.

The patch was planted in the same manner as the last eleven patches. The Korean lespedeza patch is seventy some feet from the patch.

The same four birds referred to in patches No. 13 and No. 20 also used this patch occasionally.

Cost of Feed and Cover Patch No. 21:

Fencing

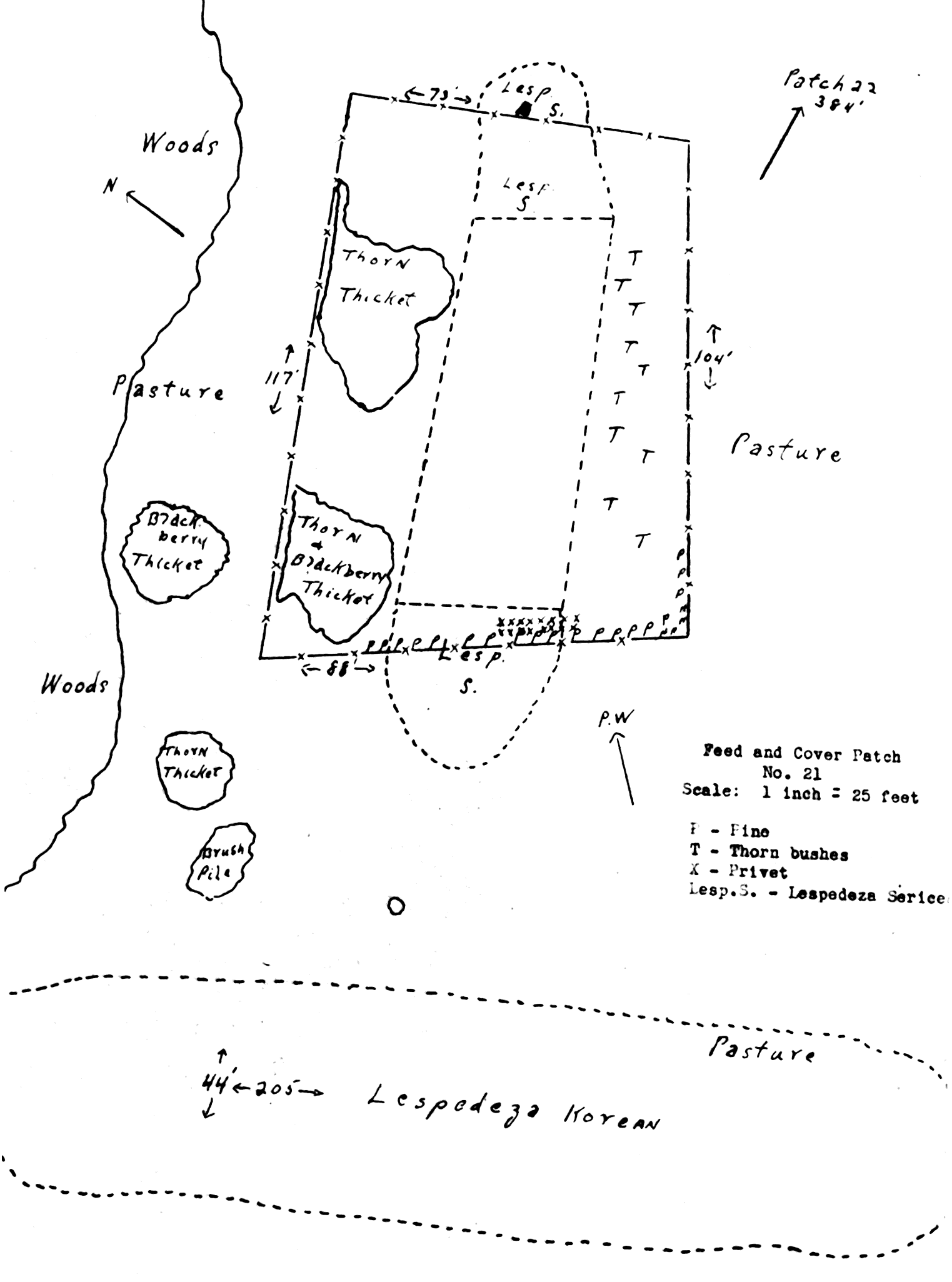
24 steel posts - .3145 each.....	$ 7.55
8 locust posts - 25¢ each	2.00
282 feet of woven wire	6.20
282 feet of barb wire	.70
Staples and nails	.15
Labor for fencing - 6 hours	1.50

Planting (1936)

Discing for Korean lespedeza - 4/15/36 1/2 hour	.50
Sowing Korean lespedeza - 4/15/36 - ½ hr.	.13
4½ Pounds of Korean lespedeza - 6¢ pound	.27
Plowing and Discing - 5/12/36 - 3/4 hr.	.75
Sowing seeds - 5/16/36 - 1/2 hour	.40
Seeds - Kaffir corn, brabham cowpeas, German Tennessee Millet, Sudan grass, and lespedeza sericea	.60
35 Pounds 4-12-4 fertilizer - 5/16/36	.42
8 Homeysuckle - 1/4 hour	.06

Planting (1937)

14 Pines 16 Privet 3 Locust - April 1937 - 1/2 hr. for all .	.12
Total	$21.35



Feed and Cover Patch
No. 21
Scale: 1 inch = 25 feet

P - Pine
T - Thorn bushes
X - Privet
Lesp.S. - Lespedeza Serice

Feed and Cover Patch No. 23.

This patch had an active gully that was working its way on out into the pasture. It was decided that this area should be taken out of the pasture and that an effort should be made to stop the erosion. The banks of the gully were raked and then sown to Korean lespedeza. Then locust, and honeysuckle were planted at random in the gully and on the banks. The banks were then mulched with wheat stubble. The cattle were turned into the pasture before the area could be fenced and they trampled most of the mulch into the bottom of the gully. Pine and locust were planted back from the gully on the windward side to provide cover as there was no suitable cover in this vicinity. There were a few thorn apple bushes, but they were not close enough together to be of much use.

During the spring of 1937, honeysuckles and coralberry were planted in rows across the gully. The plants were put approximately 10 inches apart. Privet was also planted in groups to supply fruit.

The lespedeza made a very good growth and approximately 95 percent of the locust trees of 1936 planting lived. The gully is gradually silting up from the bottom and the lespedeza and locust are slowly aiding in healing the sides.

Cost of Feed and Cover Patch No. 23:

Fencing

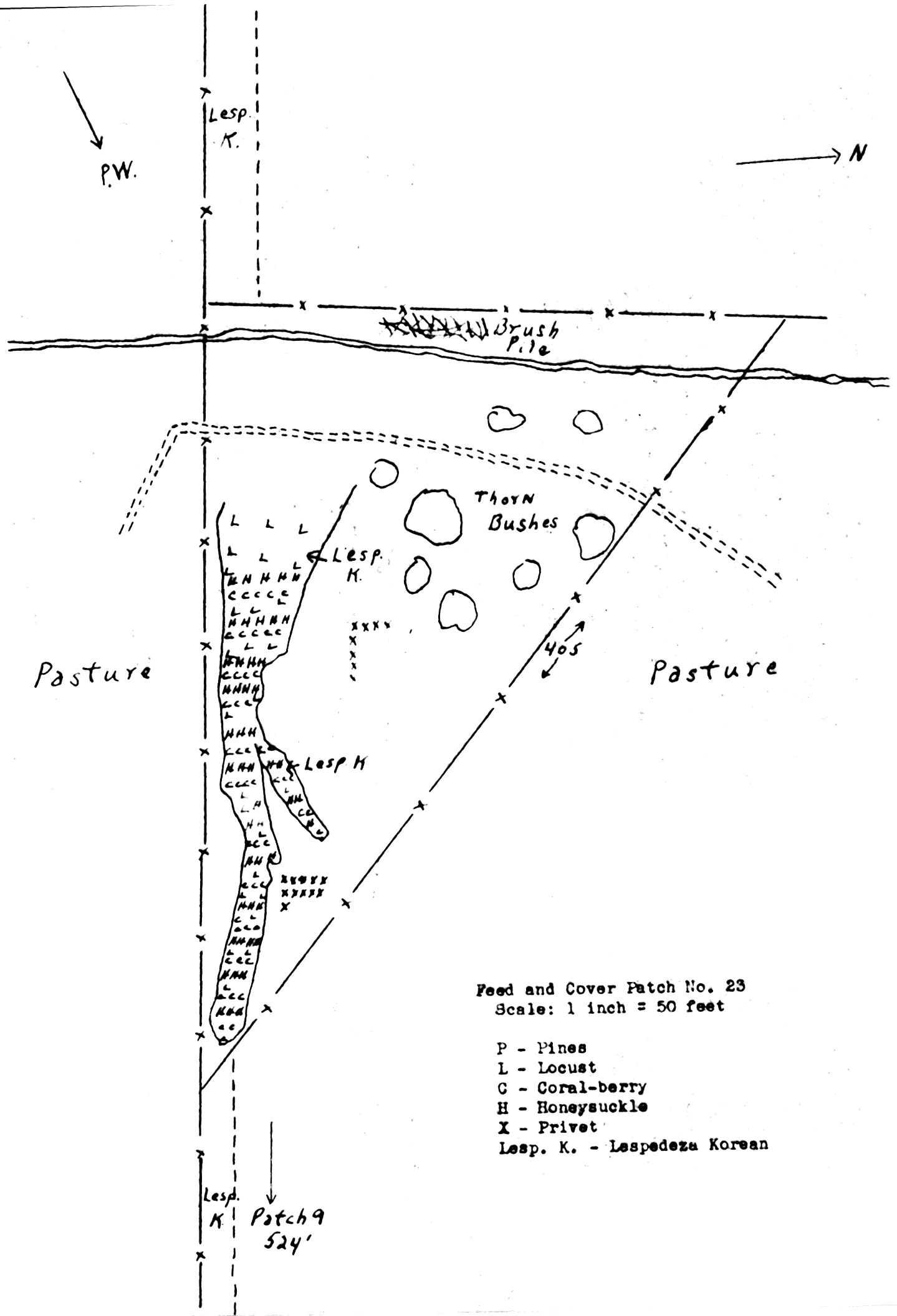
15	Steel posts - .3145 each	$ 4.72
8½	locust posts - 25¢ each	2.12
405	feet of barb wire (x3 strands)	1.48
	Staples and nails	.05
	Labor fencing - 4 hours	1.00

Planting (1936)

18	pounds of Korean Lespedeza - April - 6¢ pound ..	1.08
	Sowing Korean lespedeza and mulching - 1 hour.....	.25
71	Locust - April 1936 - 1 hour	.25
38	Pines - April 1936 - 1/2 hour	.12
35	Honeysuckle - August - 1 hour	.25

Planting (1937)

165	Honeysuckle - March 1937	
140	Coralberry - March 1937 - 2¼ hour for all	.63
61	Locust - 1 hour	.25
28	Privet - April 1937 - 1/2 hour	.12
	Total	$12.32



Feed and Cover Patch No. 23
Scale: 1 inch = 50 feet

P - Pines
L - Locust
C - Coral-berry
H - Honeysuckle
X - Privet
Lesp. K. - Lespedeza Korean

Feed and Cover Patch No. 24.

This area was an old roadway that had grown up to grass, weeds, sumac, locust, blackberry and dewberrys. The purpose of fencing it was to protect the cover and provide it out in the field. No feed patch was planted but Korean lespedeza was sown on the bank and along the fence to the road. The grass choked out the lespedeza. To the northwest was a permanent pasture field and north and northeast were cultivated fields.

Three plots were planted with sumac seeds within this patch. So far none have grown.

The fence is two strands of 4-barb wire. So far it has been sufficient to keep the cattle out.

There is no individual map prepared for this patch.

Cost of Feed and Cover Patch No. 24:

Fencing	
11 Steel posts - .3145 each	$ 3.46
4½ locust posts - 25¢ each	1.12
160 feet barb wire	.28
Staples and nails	.05
Labor for fencing - 2 hours	.50
Planting (1936)	
3 Sumac patches - 1½ hour	*.37*
Sowing Korean lespedeza	.25
8 pounds Korean lespedeza - 6¢ pound ...	*.48*
Planting (1937)	
16 Pines	
20 Privet	
15 Coralberry	
12 Honeysuckle	
15 Locust - 1½ hour for all	.38
Total	$6.89

Feed and Cover Patch No. 25.

This patch is situated about one hundred yards from a thick woods and between the patch and the woods was a fallow field in 1936. On the other side was the large pasture field in which were the last twelve patches written about. There is a small creek with a thirty to forty foot marsh with willows, thorn apples, and wild plum bushes on the edges. This patch wqs well supplied with good cover.

The feed patch was planted to kaffir corn in rows on May 16. It was planted with a corn planter and 4-12-4 fertilizer was sown at the same time. The fertilizer was applied at the rate of about 200 pounds per acre. The kaffir corn was thinned during the first working with a hoe and it received another hoeing. The plants did not make a tall growth, but they headed out well. In October when the heads were matured they were cut and spread out in an unused hen house to cure. Some heads were left in the field as feed for wildlife.

Adjacent to the patch, 96 chestnut trees were planted. The trees nearest the pasture field were watered once during the summer. Twelve pounds of lespedeza sericea was sown on the area in late may. Very few of the trees planted lived. It is estimated that about 36 of the trees survived. And the lespedeza planting was almost a complete failure. Possibly the reason for the lespedeza sericea failure was that the ground was not disced before sowing.

The fence that surrounded the feed patch and the chestnut plantings was two strands of barb wire. Since no cattle were in the field it is unknown whether it would successfully turn cattle.

About the middle of September a covey of 14 birds were flushed not far from this patch. They were young birds, but they could fly well. During early

January seven birds were flushed from the patch and in late January nine were flushed. The birds were not found again. Evidence was found that two birds had been killed by Coopers hawks.

Cost of Feed and Cover Patch No. 25:

Fencing

34	Steel posts - .3145 each	$10.69
9	Locust posts - 25¢ each	2.25
868	feet barb wire (x2 strands)	3.19
	Staples and nails	.10
	Labor fencing - 3½ hours	.87

Planting (1936)

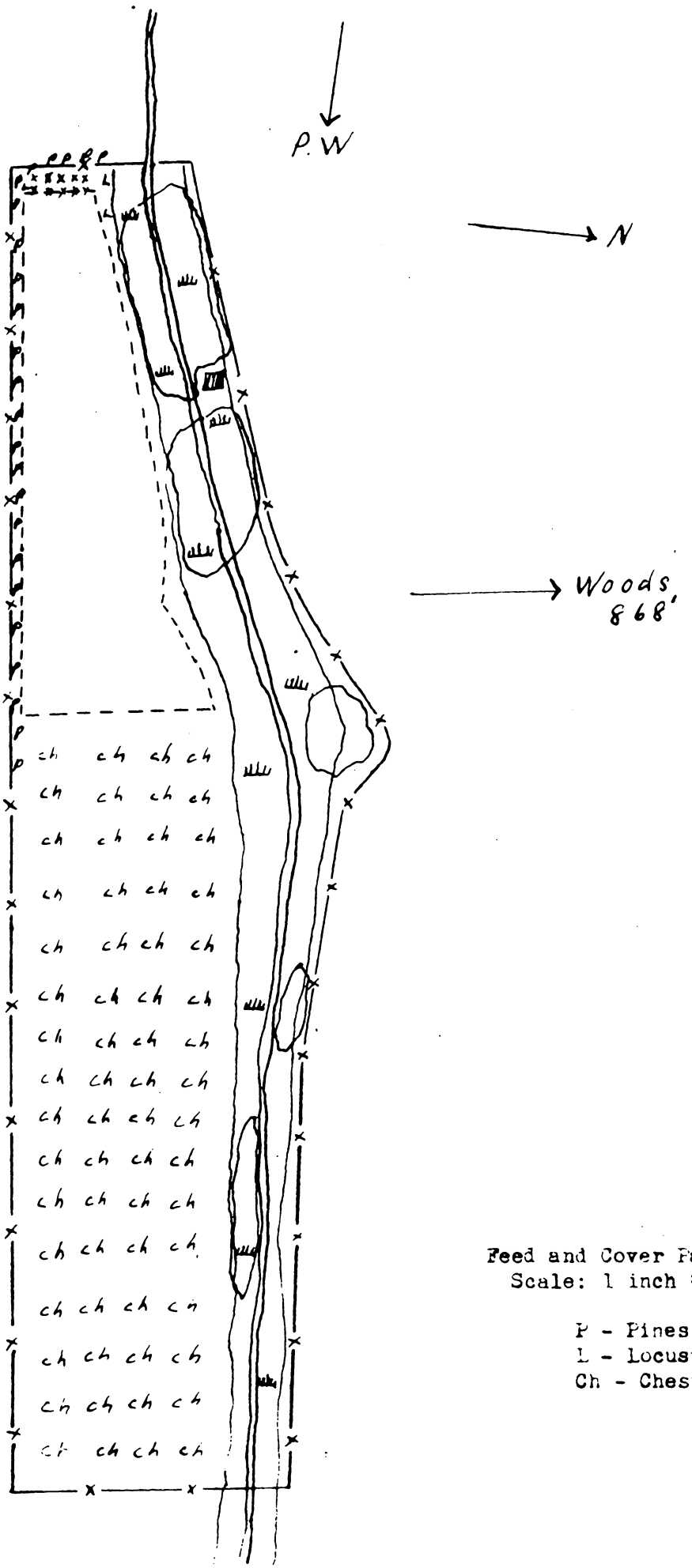
	Plowing and discing - 1 hour	1.00
	Planting Kaffir corn - 3/4 hour	.60
	Kaffir corn seed	.60
	Cultivation (twice) - 6 hours	1.50
	Harvesting Kaffir corn - 2½ hours	.63
	Labor planting 96 Chestnut trees - 4 hr.	1.00
60	Pounds 4-12-4 fertilizer	.72
	Watering chestnut trees - 2½ hours	.62

Planting (1937)

45	Pines	
7	Locust	
25	Privet - 1¼ hours for all	.31
6	Dogwoods - 1/2 hour	.18

Environmental Improvement 1937

	Live brush pile - 3/4 hour	.18
	Building and rebuilding feeding shelter - 1½ hours.....	.38
	Total	$24.82



Feed and Cover Patch No. 25
Scale: 1 inch = 75 feet

P - Pines
L - Locust
Ch - Chestnut

Feed and Cover Patches Nos. 26 and 27.

Feed and Cover Patches Nos. 26 and 27 were well supplied with cover of both woody and herbaceous types. The woods was composed of large oaks and hickories, with a very dense growth of under brush of thorn apples, wild plums, wild grapes, flowering dogwood, black haws and Virginia creepers. The herbaceous fruit and seed plants were hog peanut, wild strawberry, May apple, and partridge peas. There was a heavy stand of burdock in certain open places.

The area nearer patch No. 27 there was a very dense stand and extremely heavy growth of giant ragweed (ambrosia spp.).

These two patches were similar in that they were planted in open places in the same woods, that they were planted in rows for cultivation and harvest, and that they received the same treatment. Both patches were fertilized at the rate of approximately two hundred pounds of 4-12-4 per acre. Lespedeza sericea was sown in the Kaffir corn rows, but while cultivating the Kaffir corn it was covered. Both patches were thinned and cultivated twice. Privet was planted on the edge of the patches. Neither of the patches had to be fenced.

Cattle destroyed feed patch No. 27 because the gate was left open. Patch No. 26 made an excellent growth with large well developed heads of grain. This patch was cut when mature and was shocked, similar to corn. During the ensuing winter this Kaffir corn was used in constructing feeding shelters.

From the middle of December until the last of January two quail were flushed from Patch No. 26. There is no record of what became of them. A cock and hen ring neck pheasant used this patch the most of the winter. The cock bird was not seen after the middle of February. The hen bird, or rather a hen bird entered a pheasant pen at a residence on the campus.

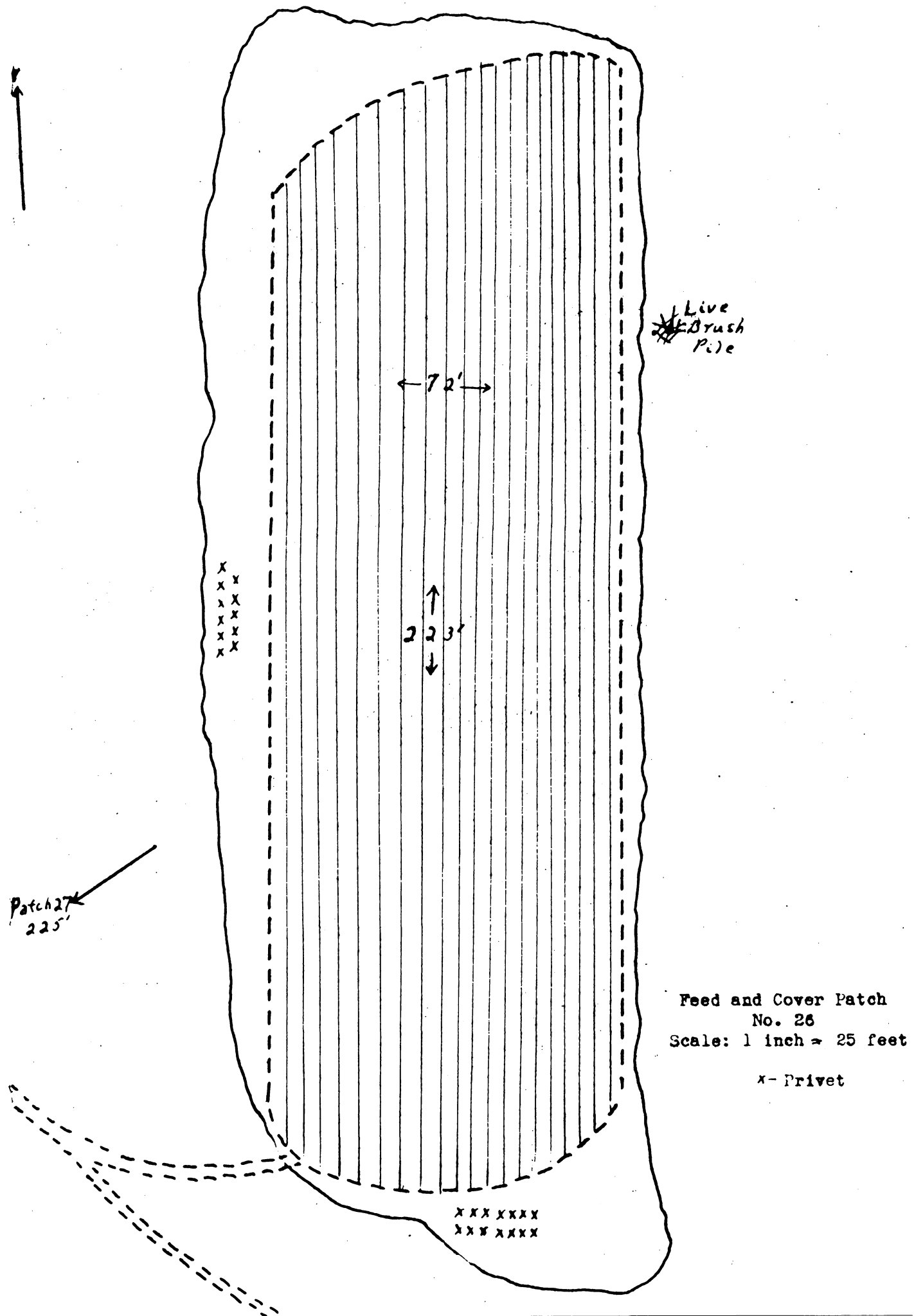
Cost of Feed and Cover Patch No. 26:

Planting (1936)

Plowing and discing - 5/11/36 - 1 hour.....	$ 1.00
Planting Kaffir corn - 5/16/36 - 3/4 hr.....	.60
Kaffir corn seed	.30
1 Pound of lespedeza sericea	.17
Cultivating Kaffir corn twice - 9 hours	2.25
Harvesting Kaffir corn - 5½ hours	1.38
45 pounds of 4-12-4 fertilizer	.54
Building live brush piles (December) 1/2 hr.	.13

Planting (1937)

25 Privet - 1/2 hour	.12
Total	$ 6.49



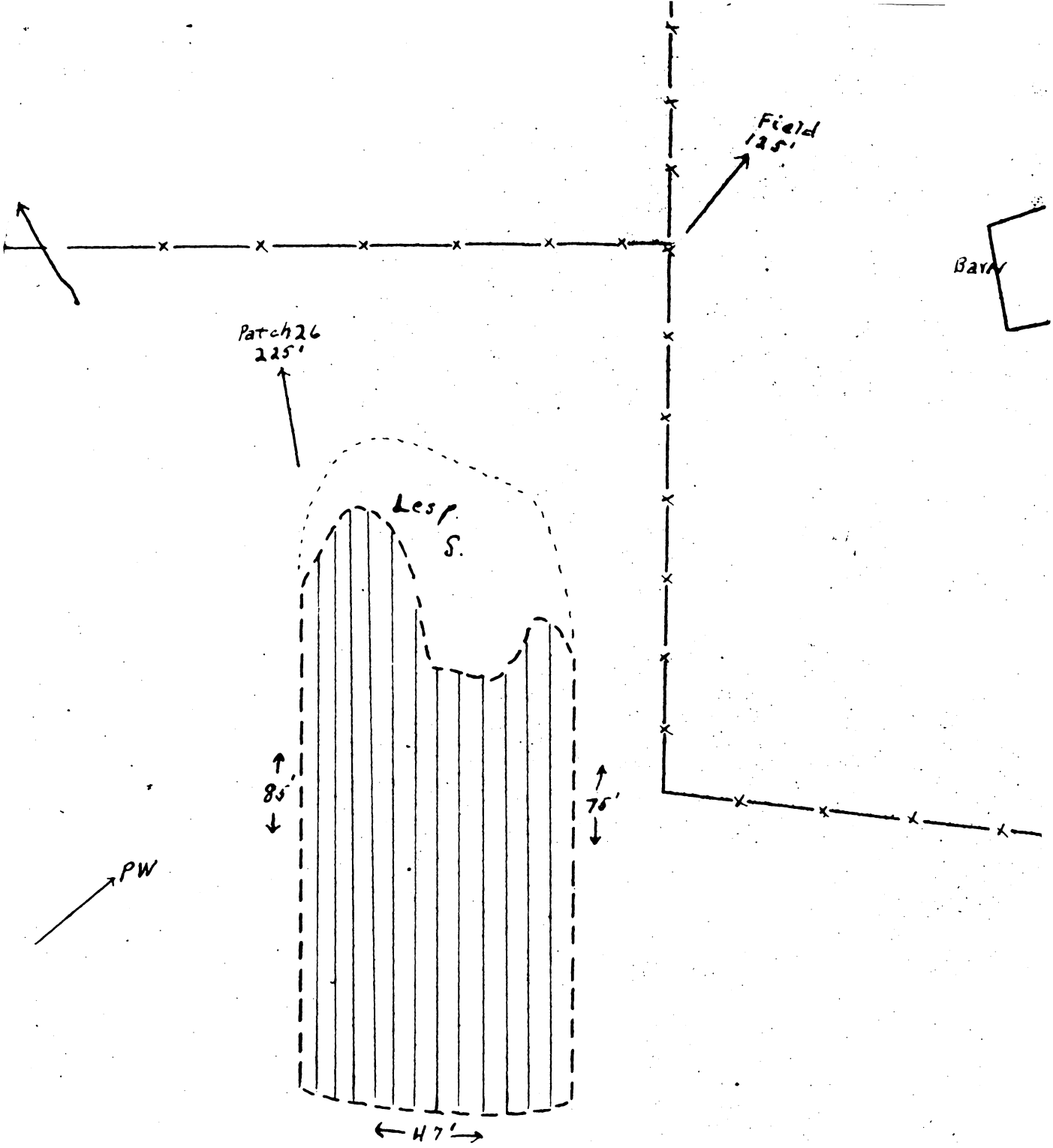
Feed and Cover Patch
No. 26
Scale: 1 inch = 25 feet

x- Privet

Cost of Feed and Cover Patch No. 27:

Planting

Plowing and Discing - 5/11/36 - 1/2 hour	$ .50
Planting Kaffir corn - 5/16/36 - 1/4 hour	.20
Lespedeza sericea - 1/4 pound	.05
Cultivating Kaffir corn twice - 2½ hours	.63
20 pounds of 4-12-4 fertilizer	.24
16 Privet - April 1937 - 1/4 hour	.06
Total	$ 1.68



Feed and Cover Patch
No. 27
Scale: 1 inch = 25 fee

x- Privet
Lesp. S. - Lespedeza Sericea

Feed and Cover Patch No. 28.

This patch was an old discarded orchard of one acre adjacent to a thick woods. There was a good stand of hog peanuts along the edge. There were wild grapes, flowering dogwoods, wild plums, and haws deeper into the woods. In the orchard there were small thickets of black berries. The patch was already fenced.

This patch was disced and sown to Korean lespedeza about the middle of March 1936. The grass, weeds and blackberry vines smothered out the lespedeza. No other grains were planted. There was no map prepared for this patch.

A feeding shelter of kaffir corn was constructed in the north corner nearest the woods. There was no evidence of birds ever using it. Four birds came from patch No. 29 during late December. There were four of them until the middle of March when one disappeared.

Cost of Feed and Cover Patch No. 28:

Discing for Korean lespedeza - 1 hour.....	$ 1.00
20 pounds of Korean lespedeza - 6¢ pound ...	1.20
Feeding shelter - 1 hour	.25
Total	$ 2.45

Feed and Cover Patch No. 29:

This patch was adjacent to woods to the east and to a blue grass hayfield to the west. The old fence between the patch and the hayfield had an excellent growth of honeysuckle growing over it. At the south end of the patch was a dense thicket of wild plums.

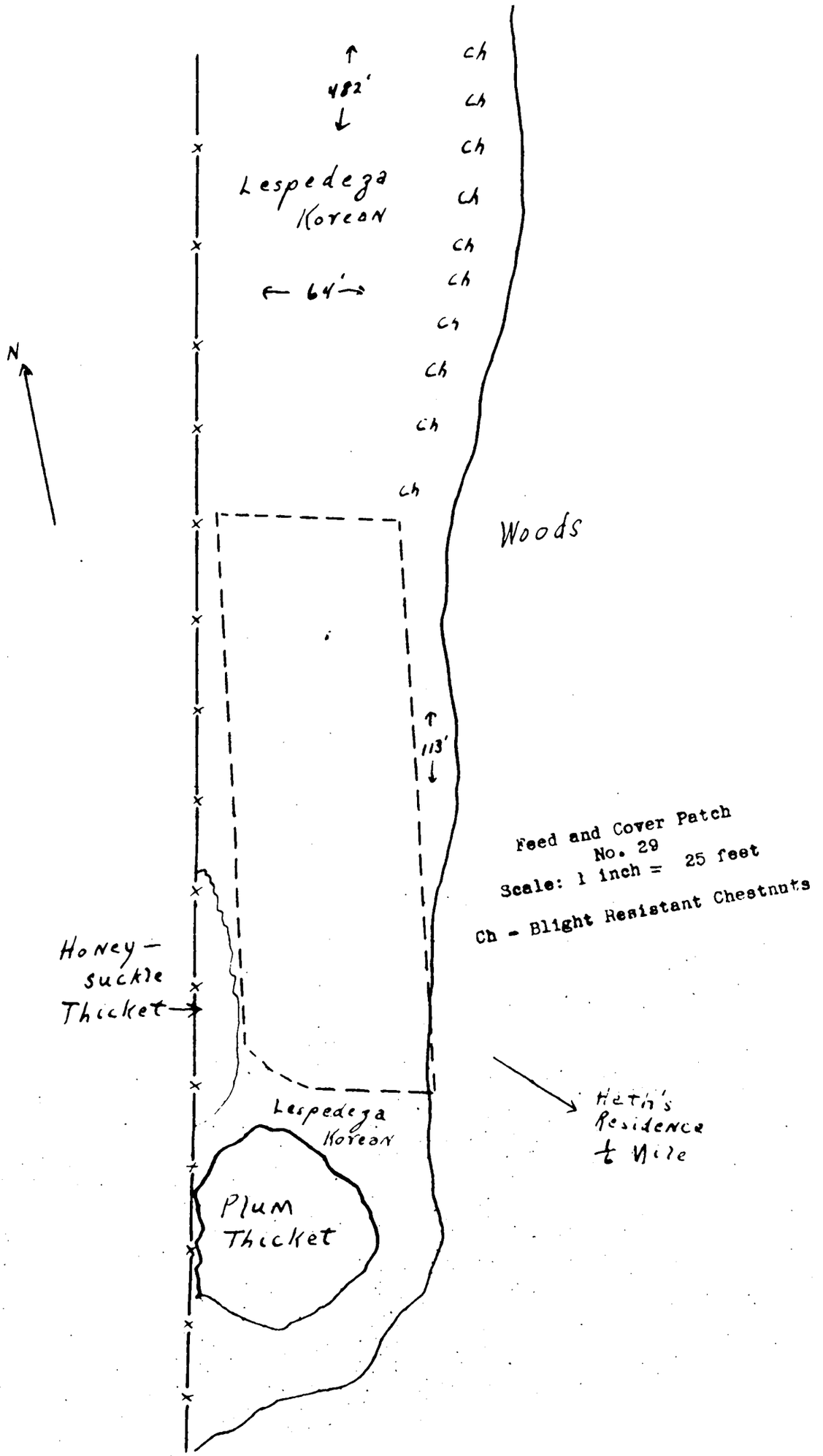
The narrow strip (fifty feet wide) that extends northward for about 150 yards was disced and sown to Korean lespedeza about the last of April 1936. In May 1936 twenty-five blight resistant chestnut trees were planted along this strip also. Both the trees and the lespedeza did well.

The patch was plowed May 13 and was planted to a mixture of Kaffir corn, brabham cowpeas, German Tennessee millet, Sudan grass and lespedeza sericea. The patch was destroyed by cattle. A storm blew a tree down and across the pasture fence and that allowed the cattle to enter the woods and from there to the feed patch.

From early fall to about the middle of December a covey of nine birds used this area. About the middle of December they disappeared and were not seen again until late December in patch No. 28.

Cost of Feed and Cover Patch No. 29:

Discing for Korean lespedeza - 4/27/36 - 1 hour	$1.00
Sowing Korean lespedeza - 4/27/36 - 1 hour	.25
18 pounds of Korean lespedeza - 6¢ pound	1.08
Planting 25 Chestnut trees - 4/7/36 - 1½ hour .	.38
Plowing and discing - 5/10/36 - 1 hour	1.00
Seeds - Kaffir corn, Brabham cowpeas, German Tennessee millet, Sudan grass and lespedeza sericea	.60
Sowing seeds - 3/4 hour	.60
35 pounds of 4-12-4 fertilizer	.42
Total	$ 5.33


482'
Lespedeza Korean
64'
N
Ch
Woods
113'
Feed and Cover Patch
No. 29
Scale: 1 inch = 25 feet
Ch - Blight Resistant Chestnuts
Honey-suckle Thicket
Lespedeza Korean
Plum Thicket
Hetn's Residence
+ Mile

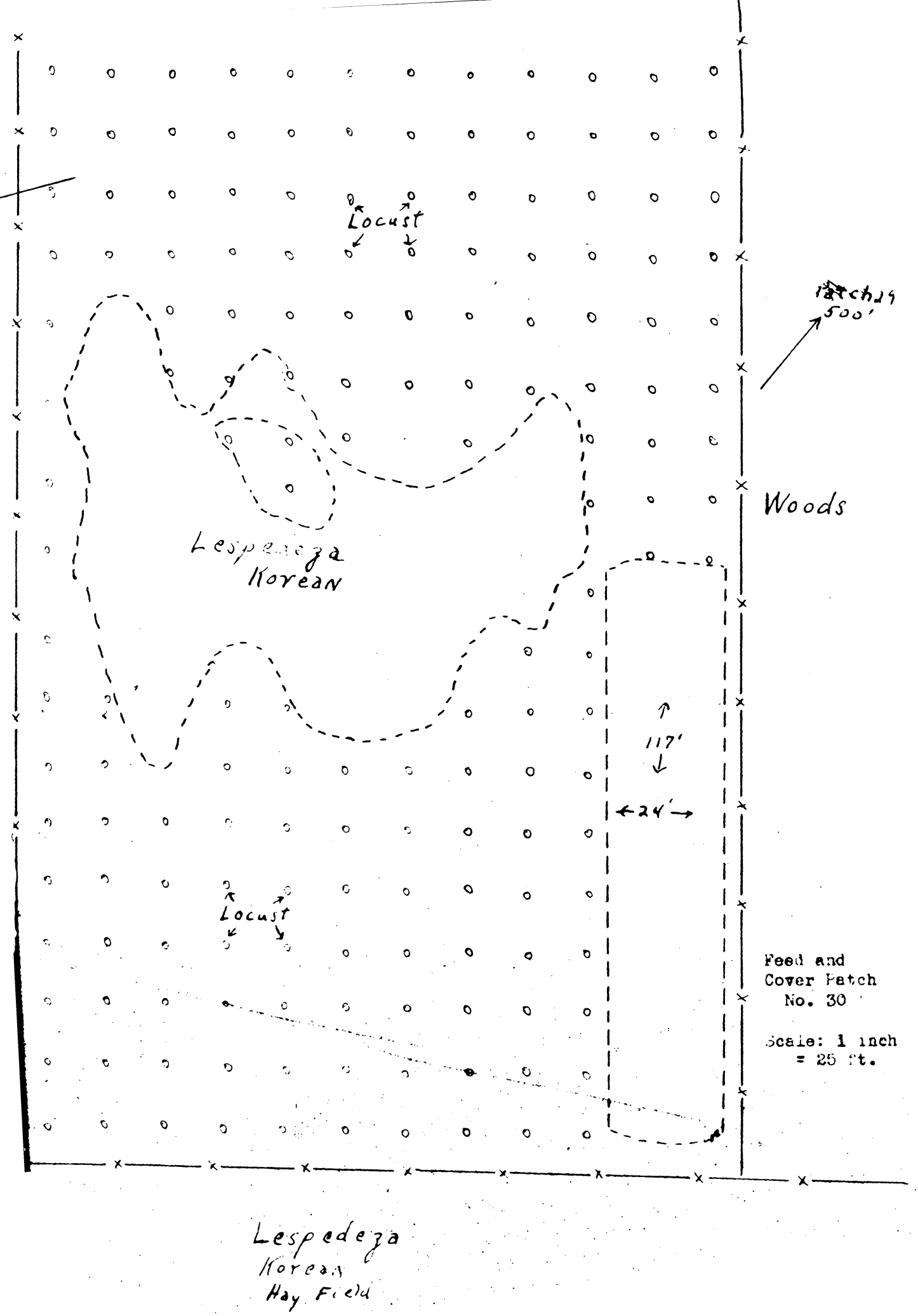
Feed and Cover Patch No. 30.

This patch was located in the corner of a planted locust grove and adjacent to woods and to the west was a Korean lespedeza pasture field. Korean lespedeza was sown within the grove where several of the trees had died. The ground was disced and sown April 27, 1935. This patch of lespedeza made an excellent growth and it is thought that it will reseed itself properly. There were scattered blackberry vines throughout most of the locust grove. The feed patch was plowed on May 10, 1936 and was sown on May 16. It made a very good growth and produced almost no seeds. Twenty pounds of 4-12-4 fertilizer was used. The locust grove was already fenced to exclude cattle, therefore, it was not necessary to fence this patch.

There was no record of quail ever using this patch.

Cost of Feed and Cover Patch No. 30:

Discing for Korean lespedeza - 4/27/36 - 3/4 hr.	$ .75
12 pounds of Korean lespedeza - 6¢ pound	.72
Sowing Korean lespedeza - 4/27/36 - 1/2 hour ...	.13
Plowing and discing - 5/10/36 - 3/4 hour.....	.75
Sowing seeds - 5/16/36 - 1/4 hour	.06
Seeds - Kaffir corn, brabham cowpeas, German Tennessee millet and Sudan grass	.30
Total	$2.71


Locust
Patches
500'
Woods
Lespedeza
Korean
117'
24'
Locust
Feed and
Cover Patch
No. 30
Scale: 1 inch
= 25 ft.
Lespedeza
Korean
Hay Field

Feed and Cover Patches Nos. 31 and 32.

Both of these patches were located near the edge of marshes, and were planted to Kaffir corn, brabham cowpeas, German Tennessee Millet, Sudan grass and lespedeza sericea. Patch No. 31 was fenced with woven wire, and patch No. 32 was fenced with barbed wire. Patch No. 31 had an excellent growth of willows, alder, elder and weeds along the creek and marsh that was inclosed in the patch and also below for about 150 yards. The marsh adjoining the patch No. 32 has only rushes and cattails, and on the higher ground nearby there was a scattering stand of broomsedge.

Both patches were plowed and disced on May 10, 1936 and sown on May 16. They were not cultivated, except the little that was done in thinning by chopping them out with a hoe. Both patches made an excellent growth and produced an excellent quantity of seeds.

Plantings of locust, pines, privet and thornbushes were made in Patch No. 31. None were planted in patch No. 32, because of sufficient cover already there, which could supply the following fruit - dewberries, poison ivy, wild cherry, Virginia creeper, elder berries, blackberries, dogwood, thornapples and wild plums. Korean lespedeza was sown on the wheat land near by. Part of that planted across the creek was plowed up and the land was planted to snap beans.

During the most of December several coveys of quail used patch No. 31. It was impossible to count them when flushed because of the large number and the manner in which they were flying. It was estimated that there were fifty birds. In January and February there were twenty-four birds that used feed patch No. 32. The covey kept decreasing in number until there were only 15 birds left in March 1937. What became of the other birds is unknown.

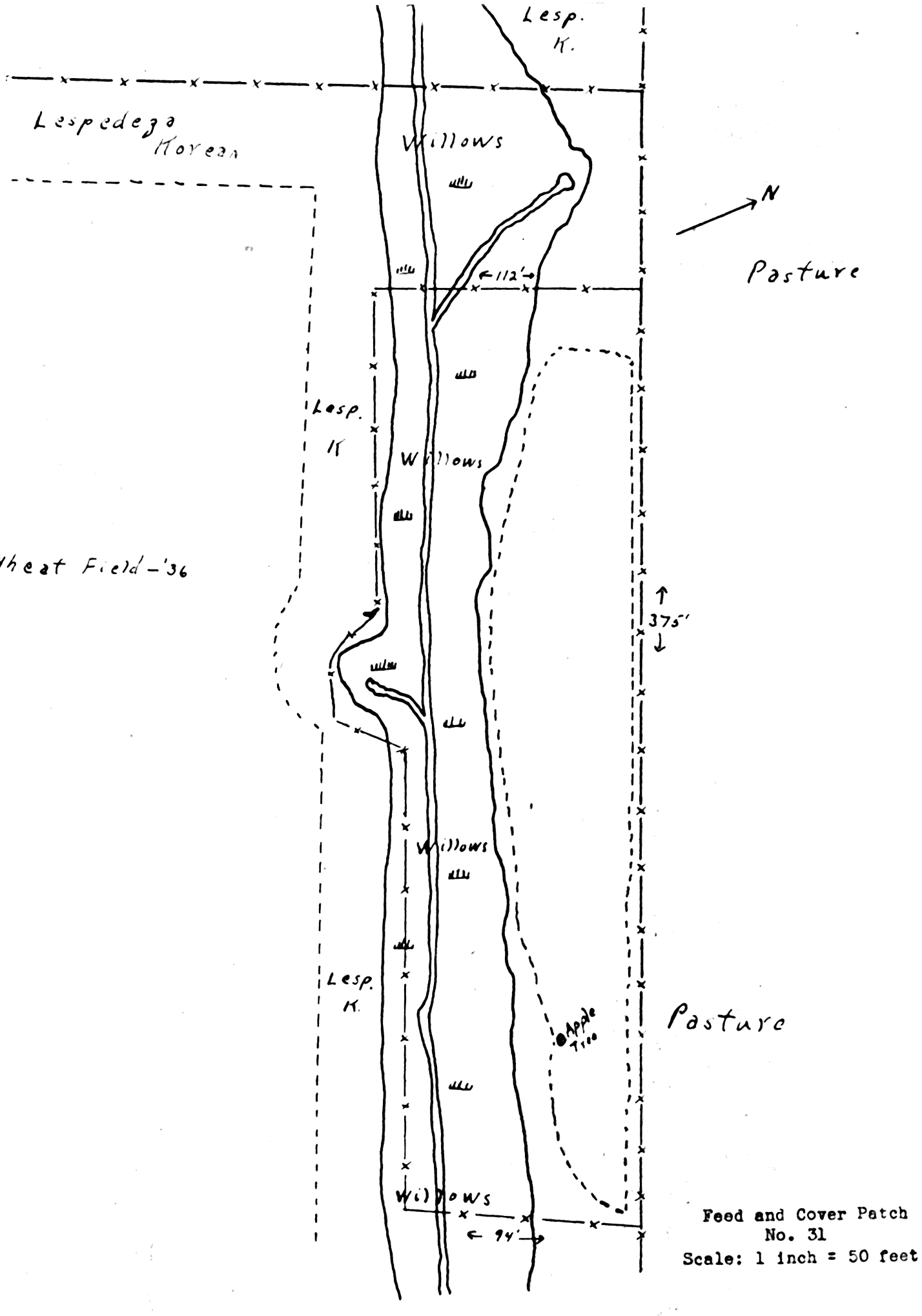
Cost of Feed and Cover Patch No. 31:

Fencing

41	Steel posts - .3145 each.....	$13.00
1½	Locust posts - 25¢ each	.38
515	feet barbed wire (x3 strand)	2.94
	Staples and nails	.12
	Labor fencing - 10 hours	2.50

Planting (1936)

52½	Pounds of Korean lespedeza - 6¢ pound	3.39
	Sowing Korean lespedeza - 3/30/36 - 4 hr.	1.00
	Plowing and discing - 5/10/36 - 1 hour	1.00
	Sowing seeds - 5/16/36 - 1/2 hour	.40
	Seeds - Kaffir corn, brabham cowpeas, German Tennessee Millet, Sudan grass and lespedeza sericea	.60
40	pounds of 4-12-4 fertilizer	.48
	Total	$25.81



Feed and Cover Patch
No. 31
Scale: 1 inch = 50 feet

Cost of Feed and Cover Patch No. 32:

Fencing

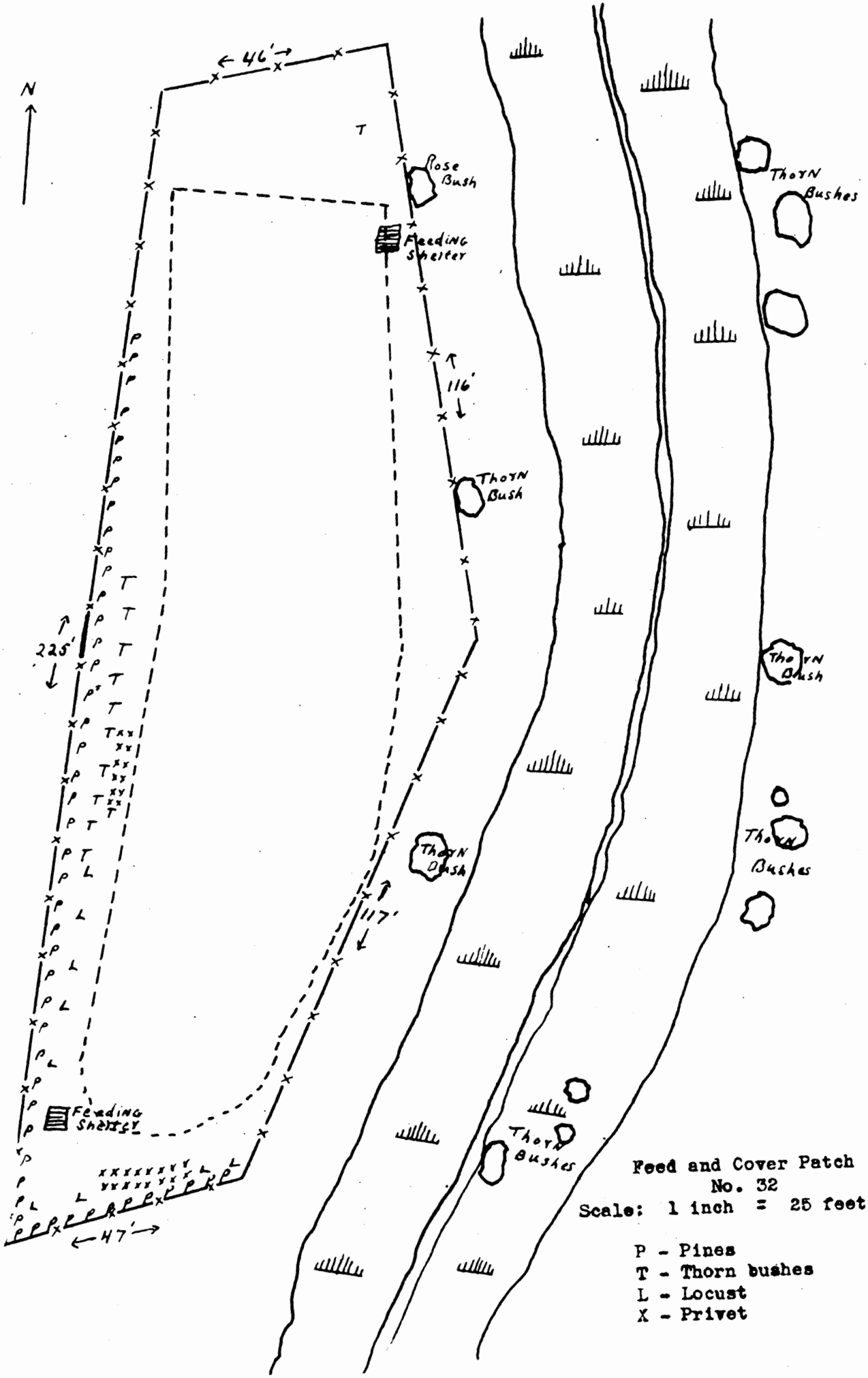
15	Steel posts - .3145 each	$ 4.72
4	Locust posts - 25¢ each	1.00
326	feet of barbed wire	.59
326	feet of woven wire	4.44
	Staples and nails	.10
	Labor fencing - 5½ hours	1.38

Planting (1936)

	Discing for Korean lespedeza - 4/15/36 3/4 hour ...	.75
	Sowing Korean lespedeza 4/15/36 - ½ hour	.12
13½	pounds of Korean lespedeza - 6¢ pound	.81
	Plowing and discing - 5/10/36 - 1 hr...	1.00
	Sowing seeds - 5/16/36 - 1/2 hour	.40
	Seeds - Kaffir corn, brabham cowpeas, German Tennessee millet, Sudan grass and lespedeza sericea	.60
40	pounds of 4-12-4 fertilizer	.48

Planting (1937)

28	Privet	
59	Pines	
11	Locust	
10	Thornbushes - 3/31/37 - 1 hour for all	.25
	Total	$16.39


N
46'
Rose Bush
Feeding Shelter
116'
Thorn Bush
225'
117'
Feeding Shelter
47'
Thorn Bushes
Thorn Bush
Thorn Bushes
Thorn Bush
Thorn Bushes
Feed and Cover Patch
No. 32
Scale: 1 inch = 25 feet
P - Pines
T - Thorn bushes
L - Locust
X - Privet

Feed and Cover Patches Nos. 33 and 34:

Patch No. 34 is a Korean lespedeza patch that was sown in the pasture and is about 270 feet from Patch No. 33. The ground was disced April 14,1936 and sown on the same date. It did not make a very good growth, but it is thought that it will reseed itself.

Patch No. 33 was located in a one acre field in the woods near a wet weather marsh. Around the marsh on the drier ground in the open was a considerable stand of beggar weeds (Desmodium spp.), lespedeza procumbens and lespedeza virginica. There were wild plum, thorn apples and blackberry thickets. The patch was plowed and disced on May 10 and was planted by hand in rows the last of May. It was cultivated once by hoeing. The seeds used were Kaffir corn, brabham cowpeas, and lespedeza sericea. Fertilizer was applied at the rate of 250 pounds per acre. The Kaffir corn and cowpeas did not make much growth or yield in seeds, due to being planted late and also the effect of the drought in May and June. The sericea did not make much of a growth either, but it appears that most of it survived the winter and there will be an excellent stand in 1937.

There was no record of quail using either of these two patches.

Cost of Feed and Cover Patch No. 33:

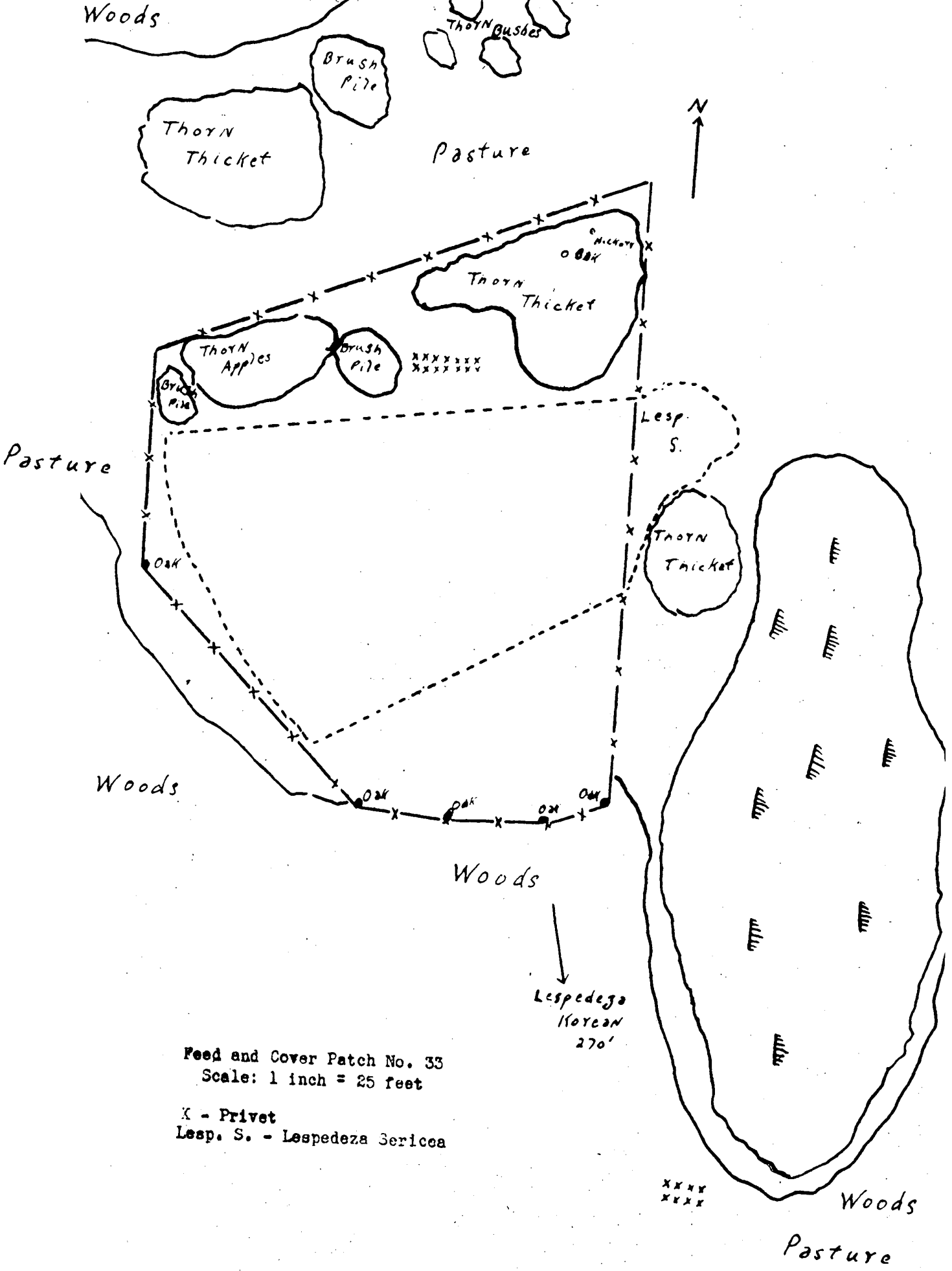
Fencing	
15 Steel posts - .3145 each	$ 4.72
5 locust posts - 25¢ each	1.25
401 feet of woven wire	5.43
401 feet of barbed wire	.50
Staples and nails	.15
Labor for fencing - 6⅓ hours	1.62
Planting (1936)	
Plowing and discing - 5/10/36 - 1 hr...	1.00
Planting seeds - 3½ hours	.88
50 pounds of 4-12-4 fertilizer	.60
Seeds - Kaffir corn, brabham cowpeas, and lespedeza sericea	.70
Total	$16.85

Attention Patron:

Page 91 omitted from numbering

Cost of Feed and Cover Patch No. 34:

Discing for Korean Lespedeza - 4/15/36 - ½ hour	$ .50
Sowing Korean Lespedeza - 4/15/36 - 1/2 hour ...	.13
9 pounds of Korean lespedeza - 6¢ pound	.54
Total	$1.17



Feed and Cover Patch No. 33
Scale: 1 inch = 25 feet

X - Privet
Lesp. S. - Lespedeza Sericea

Feed and Cover Patches Nos. 35 and 36.

Patch No. 35 was the edge of a wheat field sown to Korean lespedeza, along an old rail fence and along the woods. The open places in the woods were fairly good stands of beggar weeds and lespedeza striata. There were blackberry and a few honeysuckle thickets along the rail fence.

Patch No. 36 was also a Korean lespedeza patch located in an opening and along an old abandoned road in a park-like woods. There were a considerable number of large brush piles and dense blackberry thickets through the entire area.

The lespedeza in the patch No. 35 was seeded on March 24 and 26, 1936 on growing wheat at the same time that clover and timothy was being sown. The lespedeza seed was sown at the rate of approximately 15 pounds per acre.

Patch No. 36 was an open area in the woods. The patch was not fenced and cattle grazed it fairly heavily, but even at that it will reseed itself it is thought.

It was disked on April 18, 1936 and was sown the same day. It is estimated that the lespedeza was sown at a rate of approximately 11.5 pounds per acre.

A covey of 13 quail was seen along the edge of both lespedeza patches several times during the winter. This covey maintained its number until the middle of March after which time they were not seen again. It is thought that they moved their range further up into the woods.

Cost of Cover Patch No. 35:

Sowing Korean lespedeza - 4½ hours	$ 1.12
62 pounds of Korean Lespedeza - 6¢ pound	3.62
Total	$ 4.74

Cost of Feed and Cover Patch No. 36:

Discing for Korean lespedeza - 1¾ hours.....	$ 1.75
Sowing Korean lespedeza - 2 hours	.50
70 pounds of Korean lespedeza - 6¢ pound	4.20
Total	$ 6.45

Feed and Cover Patch No. 37.

This patch was an old roadway. The banks and the old road itself was eroding very fast. To stop this erosion it was thought advisable to sow it to Korean lespedeza. The lespedeza was sown at the rate of approximately 24 pounds per acre. A small amount of old corn stalks was thrown on the banks. The rain washed the seeds against the corn stalks and consequently the only places where the lespedeza grew was next to the corn stalks. There was not sufficient lespedeza on the area to do much towards stopping the erosion. No cattle used this area therefore there was no need to fence it.

There was no record of any quail using this patch.

Cost of Feed and Cover Patch No. 37:

Sowing Korean lespedeza - 1/4 hour	$ .06
6 pounds of Korean lespedez a - 6¢ pound	.24
Labor for mulching - 1/4 hour	.06
Total	$ .36

Feed and Cover Patch No. 38.

This patch is located in a peach orchard. The drought during May and June prevented this patch from being prepared before July 11, 1936. To produce a crop before frost it was necessary to plant buckwheat. The buckwheat was sown on July 11 and fertilizer was sown at the rate of 200 pounds per acre after the ground was disced with a Wheatland disc. The buckwheat was smothered out almost entirely by the grass.

There is no record of quail using this patch, or the area around the quarry where 17½ pounds of Korean lespedeza was sown on April 28. The lespedeza was smothered out by the weeds. No cattle used this area, therefore there was no need to fence it.

Cost of Feed and Cover Patch No. 38:

Discing for buckwheat - 5/10/36 - 1 hour.....	$ 1.00
11 pounds of buckwheat seed - 2.4¢ each.....	.24
Sowing buckwheat - 5/10/36 - 1 hour .....;.	.25
Total	$ 1.49

Feed and Cover Patches Nos. 39, 40, 41 and 42.

All four of these patches were planted to Kaffir corn and brabham cowpeas in the last twenty feet of each corn row. The Kaffir corn and cowpeas were planted by using a hoe and dropping several seeds in the hole and then covering them. The corn was approximately three inches high when the Kaffir corn was planted. All four of the patches were a complete failure, partly due to the drought condition and the young plants being covered while the corn was being cultivated. No fertilizer was used. None of the patches needed to be fenced.

Along the fence in patch No. 39 several live brush piles were made by cutting saplings and small trees half way through and pulling them over. They will continue to grow and will make good cover. Along the old road by the patch lespedeza was sown. It did fairly well. In March 1937 the entire triangular area was sown to Korean lespedeza in growing rye.

Along the old rail fence at patch No. 40 a strip 12 feet wide was disced April 17 and sown to Korean lespedeza on April 20. The lespedeza made a good growth, but it is doubtful if it will reseed itself properly due to the grass. A feeding shelter of Kaffir corn was constructed. There is a record of 5 quail using it once.

Patch No. 41 was sown to Korean lespedeza on growing wheat in March 1937.

Patch No. 42 was also sown to Korean lespedeza on growing wheat in March 1937.

Cost of Feed and Cover Patch No. 37:

Planting Kaffir corn, brabham cowpeas - 1¼ hours	$ .37
Seeds - Kaffir corn and brabham cowpeas	.30
11½ pounds Korean lespedeza 1936 - 6¢ pound	.69
50 pounds of Korean lespedeza - 1937 - 17¢ pound	10.20
Labor building live brush piles - 2 hours	.50
Total	$12.06

Cost of Feed and Cover Patch No. 40:

Discing for Korean lespedeza - 4/17/36 - 1 hour	$ 1.00
Sowing Korean lespedeza - 4/20/36 - ½ hour ...	.38
19 pounds of Korean lespedeza - 6¢ pound	1.14
Feeding shelter - 1 hour labor -	.25
Planting brabham cowpeas and Kaffir corn, June 1936 - 4 hours ...	1.00
Seeds - Kaffir corn and brabham cowpeas	.20
Total	$ 3.97

Cost of Feed and Cover Patch No. 41:

Planting Kaffir corn and brabham cowpeas - June 1936 - 1½ hours	$ .38
Seeds - Kaffir corn and brabham cowpeas	.15
Sowing Korean lespedeza - March 1937 - 3/4 hour	.18
20 pounds of Korean lespedeza - 17¢ pound	3.40
Total	$4.11

Cost of Feed and Cover Patch No. 42:

Planting Kaffir corn, brabham cowpeas - June 1936 - 3½ hours	$ .88
Seeds - Kaffir corn and brabham cowpeas	.25
Sowing Korean lespedeza - March 1937 - 2½ hours	.62
45 pounds of Korean Lespedeza - 17¢ each	7.65
Total	$9.40

Feed and Cover Patches Nos. 43, 44, and 45.

These three patches are primarily cover patches. They were fenced to keep the cattle out in order that the natural shrubs could develop. All of the areas were enclosed with a strand of barbed wire fence.

Patch No. 43 is located in woods that is pastured unusually heavily. The natural shrubs in the patch that can produce fruit that might be used by quail are - Virginia creeper, poison ivy, thorn apples, hawthornes, wild plums, blackberries, dewberries, raspberries, and dogwood. A big improvement in the growth and conditions of the plants could be noticed after just one growing season.

Patches Nos. 44 and 45 are both very small patches, approximately 40 feet square. There was an excellent thicket of thorn apples and cratargus which were about two feet tall. Then in March of 1937, pines, locust, privet, coralberry and honeysuckle were planted.

Cost of Feed and Cover Patch No. 43:

11	Steel posts - .3145 each	$ 3.46
425	feet of barb wire (x2 strands)	1.54
	Staples	.05
	Labor fencing - 1½ hours	.38
	Labor repairing fence - 3/4 hour	.18
	Total	$ 5.61

Cost of Feed and Cover Patch No. 44:

4	Steel posts - .3145 each	$ 1.26
6	Locust posts - 25¢ each	1.50
167	feet of barbed wire (x2 strands)	.62
	Labor fencing - 3 hours	.75
	Staples	.05
11	Privet	
16	Honeysuckle	
11	Coralberries	
16	Pines	
6	Locust - April 1936 - 1 hour for all	.25
	Total	$ 4.43

Cost of Feed and Cover Patch No. 45:

4	Steel posts - .3145 each	$ 1.26
6	Locust posts - 25¢ each	1.50
156	feet of barb wire (x2 strands)	.60
	Labor fencing - 3 hours	.75
	Staples	.05
6	Privet	
15	Honeysuckle	
13	Coralberry	
14	Pines	
7	Locust - April 1937 - 1 hour for all	.25
	Total	$ 4.41

Restocking -

On September 25, 1936, twenty adult quail were received from the Virginia State Game Farm. These quail were banded and released on the same day as received. Ten of them were released approximately 200 feet above the middle lake and on the opposite side of the creek from the lake. The other ten were released in Feed and Cover Patch No. 24. It is not known whether they survived or not.

It was decided that if any quail eggs which had been deserted by quail were found, that they would be incubated in an electric incubator, and the quail chicks were to be raised by the writer for either restocking purposes on the area, or to be used as experimentally birds.

On June 3, 1936 a quail nest and 13 eggs were cut over in the hayfield to the west of Feed and Cover Patch No. 24. The nest was about 30 feet from the edge of the field. The eggs were put in a wire basket and put in an electric incubator. They were given the same treatment as the turkey eggs that were already in the incubator, which was the usual care of eggs in an incubator. On June 25, twelve quail hatched. The thirteenth egg was cracked while handling in turning the eggs during incubation.

On June 9 a quail nest and 16 eggs were cut over in the hayfield to the west of the Feed and Cover patch No. 1. The nest was about thirty-five feet from the edge of the field. The eggs were placed in an electric incubator. On July 1 ten of the eggs hatched. Two quail died in the process of coming out of the egg from the small end of the egg. Four of the eggs had embryos that had died during the first week of incubation.

On July 1, eighteen quail eggs were secured from off the area. They had been found in a wheat field, while cutting the wheat. They received the

same treatment as the second clutch of eggs. On July 22 nine of the eggs hatched. The other nine eggs were fertile, however, all of the embryos died at hatching time because they turned towards the small end of the egg.

On July 11, twelve quail eggs were placed in the incubator. There is no record of where they were gotten from. On July 25, ten eggs were hatched. One died while hatching and the other egg was infertile.

All of the eggs were elevated so as to have the top of the eggs level with the top of the turkey eggs in the incubator.

The quail chicks were kept on wire on the fifth floor of the Agricultural Hall until the latter part of September. For the first two weeks they were kept in a Coleman's Quail brooder, and then they were transferred to wire pens (2 feet wide, 4 feet long, and 18 inches high). They were fed on Coleman's Quail mash, chopped clover leaves, sliced cucumbers, oyster shell and grit.

Considerable trouble was had by their pecking one another to death. Their bills were clipped several times, but they would grow again rapidly and would start in pecking again. For a while at first, two ages of chicks had to be kept together, and the result was that the older ones ran over the younger ones, and also the pecking seemed to be worse, especially so for the younger ones. Only three died from undeterminable causes, other than pecking or accidents. Considerable trouble was also experienced in their flying against the wire top and scalping themselves. This was partially prevented by attaching cheese cloth to the top of the pens. This broke the blow to some extent.

Twenty-one quail were raised to three-fourths grown or larger. During a rainy spell in November the pen was not moved for several days and as they were on the ground it became filthy. In a few days they started dying at the

rate of one to three a day. They were taken off of the ground and placed on wire, but they continued to die until only one bird was left.

This one cock bird was brought back to the fifth floor of the Agricultural Hall and kept over winter on wire. It developed a sore on its foot which continued to get worse until the leg sluffed off at the knee joint. On December 12, a wild cock quail with a broken wing was caught by hand and put in the same pen. There was no fighting between the two birds. Both of these birds were released the latter part of March 1937 on Joe Rud's farm in Roanoke Valley.

COST OF DEMONSTRATION
1936

Labor:

Labor at 25¢ per hour - 305 hours	$ 76.25	
Tractor and Man at $10 per day - 5-1/3 days ..	53.00	
Man and Team at 80¢ per hour - 8 hours	6.40	
		$ 135.65

Fencing Materials:

320 rods of 6 inch sheep fence - 22½¢ per rod.	$ 72.00	
13 rolls of Barbed Wire (12½ and 13 gauge) ..	31.82	
507 Steel post - 84 inch angle post	159.45	
220 locust post - 25¢ each	55.00	
35 pounds of 30 penny nails	2.50	
30 pounds of staples - 5¢ per pound	1.50	
		$ 322.27

Fertilizer:

1000 pounds of 4-12-4 fertilizer	$ 12.32	
		$ 12.32

Seeds:

70 pounds of Lespedeza Sericea ....17¢	$ 11.90	
700 pounds of Korean Lespedeza ..... 6¢	42.00	
1 bushel of Brabham Cowpeas	2.75	
130 pounds of Kaffir corn	4.57	
25 pounds of Sudan Grass	1.19	
110 pounds of Buckwheat	2.70	
		$ 65.11

Plantings Other Than Feed and Cover Patches:

Grape vine planting - 24 hours at 25¢ hour	6.00	
Lespedeza Sericea plantings in eroded and gully areas (shown on big map) - 24 hours at 25¢ per hour	6.00	
		$ 12.00
Grand Total		$ 547.55

DISCUSSION AND SUMMARY

As stated before the major limiting factor for quail on the area is cover. So far the main type of cover that has been produced is the cover afforded by the grains planted in the Feed and Cover Patches. In a few years the pines, privets, honeysuckles and coral-berry plantings will begin to afford some cover. During the meantime the native shrubs that are protected from cattle will be of more service than before. It takes years to produce cover and it is the writer's opinion that a good start has been made towards attaining permanent woody cover.

The grape cuttings and the sumac seed plantings have been a complete failure. It is thought that the drought in May and June of 1936 was the cause.

It will be several years before any real cover or food can be realized by the quail from the honeysuckle, privet, coral-berry, pines, locust, and chestnut tree plantings.

The Korean lespedeza plantings on the whole were very satisfactory as to growth and yield of seeds. It is next to impossible to tell from field observations just how much the quail do feed on anything. But it is thought that the Korean lespedeza plantings were used some. The lespedeza sericea plantings in the patches did well, but those in eroded areas and on lands that had not been disced were almost a complete failure.

Due to the drought of May and June of 1936 a large part of the chestnut trees died. It is somewhat questionable as to the value that quail will realize from the chestnut plantings, other than the additional cover provided by fencing the area against cattle.

The feeding shelters are not thought to be of much value in this territory and especially so during a mild winter similar to the one of 1936-37. Feeding shelters tend to localize the birds and if they use the same place day after day it increases predation. It appeared as if the shelters constructed of corn and corn fodder were used the most. More work needs to be done before any definite conclusions can be drawn.

Most of the feed and cover patches produced very good food and cover. The native shrubs and grasses protected by the fencing showed a big improvement over those not protected. In a few years the planted shrubs will have grown to cover most of the uncultivated area in the patches, thus supplying an abundance of cover adjacent to the feeding area.

The most important cost of the demonstration and the feed and cover patches was the item of fencing. The average fencing cost for the average size patch (112 feet by 65 feet) was approximately $6.00. These fences with minor repairs from time to time will last over a period of years. Therefore, the cost of fencing and the planting of the trees and shrubs should be divided over a period of years, which brings the cost of the first year down. The main item of expense after the first year will be that of replanting the annual grains in the patches and that probably will not cost over $2.00 per patch.

Not much was done in regard to the problem of making the quail available to the sportsman since it is estimated that it will be several years before there will be sufficient quail on the area to justify shooting. Thirty-seven hunters were asked if they would consider regulated hunting at a charge of 25¢ per quail and ten cents per squirrel and fifteen cents per rabbit, too high. All but two of them thought those prices fair, the other

two were not quail hunters, but they thought the prices were fair for rabbits and squirrels.

In the fall of 1935 there were 195 quail on the area and in the fall of 1936 there were 146. In the spring of 1936 there were 96 quail and in the spring of 1937 there were 99. A higher winter survival would be expected for the winter of 1936-37 because it was so much milder winter and the birds had the benefit of the feed and cover patches. It is impossible to determine the effect that the feed and cover patches had on the survival, but it is thought that there was quite a bit.

During the fall of 1936, the demonstration area was increased in size by including approximately two thousand five hundred acres of land owned by twenty farmers. The farmers placed this land in a state game sanctuary for a period of five years, and also signed a contract to practice game management on their lands. The purpose of increasing the area was to study game management practices on privately owned as on public lands.

It is impossible to make any definite statement at this time as to whether or not quail can be considered to be a profitable additional farm crop on the average farm in Montgomery county. After this demonstration has been continued for several years, then some definite conclusions can be drawn.

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