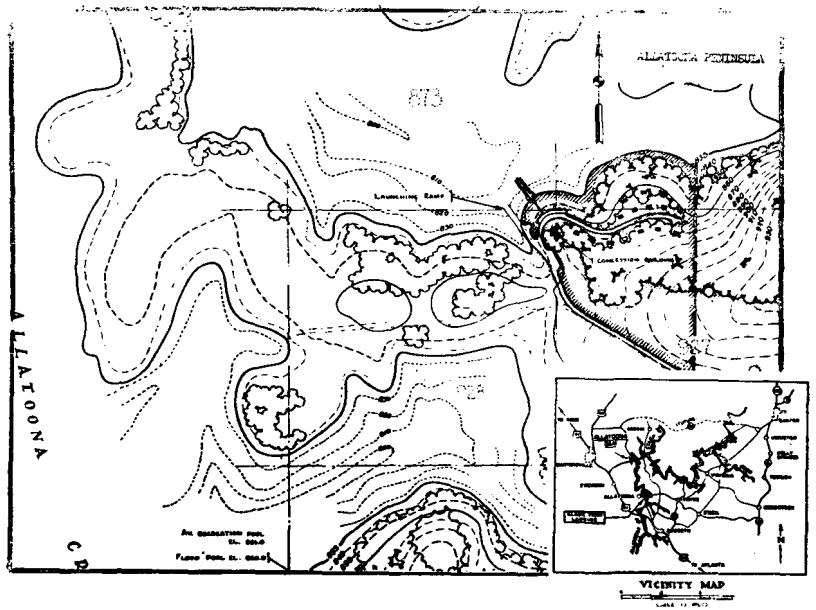

RESULTS OF KENTUCKY'S WILDLIFE PLANT AND SEED DISTRIBUTION PROGRAM FROM 1949 TO 1956

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I. INTRODUCTION

Twelve or fifteen years ago, habitat improvement was considered the most important tool in the management of practically all wildlife. During the past five years or so, a more skeptical view has been taken of habitat improvement on private farmland. Game produced that way costs more than forest game and waterfowl produced on public lands, and in the management of farm game, emphasis has been shifted to hunting regulations as a management tool. Population and hunter success surveys are made to gather data on which these hunting regulations can be based.

It might be worthwhile to remember that about 85 per cent of the game harvested comes from private lands. And hunters probably would appreciate biologists more if we would actually increase the production potential, rather than just telling them how much they can kill without depleting the brood stock.

Farm game does have one advantage over forest game and waterfowl. It is more generally distributed, and more convenient to a much larger number of hunters.

Small game management techniques have been so thoroughly proven that there is no need to wait for better ones. Any biologist will admit that, given control of a farm, he can increase all kinds of small game present. There is a great opportunity to get agricultural workers to include wildlife management practices in their farm management plans.

Farm game management has been included in the Kentucky Pittman-Robertson program since 1948. Like other states in the Southeast, Kentucky had primarily a plant distribution program. In addition to the plantings and other habitat

improvements, a considerable backlog of information has been compiled about effectiveness of different methods as well as on the culture of the plants themselves.

It is the purpose of this paper to sum up all these results.

II. TANGIBLE RESULTS

Tangible results are more obvious than knowledge acquired, and most of the tangible results are plantings.

A. Ways of Measuring Results

Several methods of measuring results have been employed. One of the first was to simply add up the number of plants and seed distributed. This method is very inaccurate, and has never been used in Kentucky except in conjunction with other measurements. Percentage of plants wasted may vary from 50 per cent to 90 per cent, or more.

Probably the most common method in use now is to count all, or a definite sample of the plantings which appear successful, sometime during the first growing season.

There were two reasons for selecting the first growing season as the time for this check. (1) A high percentage of the plantings were seen during the follow-up work done to encourage farmers to care for them, so the job could be completed with just a little extra work. (2) When methods were being changed so frequently, it was desirable to measure results as soon as possible.

This method would be much more accurate if carried out later. If annual seed plots were checked during the late winter, there would be no guessing about whether or not they would make seed. If perennials were checked during or after the second growing season, there would be less error in separating the good ones from the bad ones.

Some rose and shrub lespedeza planting can be rated good or bad quite accurately, when they are young. But there is always a larger group that have a doubtful future. The high standards used in Kentucky before 1955 for grading plantings were severely criticized, but everyone admitted that even with those high standards, many of the plots rated "Good" never became productive.

Another method was to determine the number of counties in which effective plantings were established. Conservation Officers were asked to supply this information.

A fourth method of measuring results was to collect information about individual mature plantings. Most of this information was obtained by sending questionnaires to the farmer cooperators for four years. These questionnaires also yielded information on wildlife use of plantings, which was the fifth yardstick.

B. Data on New Plantings

Although data on new plantings are not a good measure of accomplishment, they are about the only index for comparing different methods, areas, and years of work.

1. *Shrub Lespedeza:* When the planting program was first started in Kentucky, bicolor lespedeza was the primary plant. Rose was recommended for fencing the shrub lespedeza plots only. In areas considered suitable for development, cover was thought to be adequate. Only four acres of bicolor were established in 1949. By 1952, when the District Biologist system was adopted, the annual acreage had increased to 48 acres. By 1954, the annual area was back down to 15 acres. During 1955 standards for grading plots were lowered, and for the 1956 season, 57 acres were rated "Satisfactory." In 1956, 72 per cent of the plots were rated "Satisfactory." Prior to the change in grading, the per cent of plots rated good had varied from 32 per cent to 56 per cent.

Table I shows the number of plants distributed and plots reported.

2. *Multiflora Rose:* Multiflora rose has had a better chance than any other planting technique in Kentucky. It has not always been pushed vigorously, but it has never been strongly opposed by anyone in the wildlife department.

Methods for tabulating the rose fences varied from year to year. In 1952, 581 fences were reported. In 1953, 140 miles of fence was considered satisfactory. In 1956, only 31 miles of fence was approved, but this represented 48 per cent of the plants distributed. Table II shows the number of rose plants used, and data on establishment.

3. *Seed Distribution:* Table II shows the amount of seeds distributed, and data on planting reported from 1953 to 1956. No standards were established for any of these plantings, and little or no effort has been made to test the accuracy of judging the plots. It is probable that critical evaluation would weed out more of the seeded plantings than those established from plants.

4. *Miscellaneous Habitat Improvement:* To most biologists, use of habitat already on the land is more attractive than "artificial" methods, such as plantings. During the first four years of the program, these activities were carried out through the Soil Conservation Service. The futility of cleaning up land that could not be made productive was pointed out.

In 1954, biologists took over this phase, and ragweed patches or ungrazed woodlots were established on 16 farms. In 1955 miscellaneous activities were reported on 74 farms, and in 1956 on 22 farms.

C. Data on Old Plantings

Apparently all evaluation of this program is done before plantings actually produce anything, and apparently no one has evaluated these evaluations. Nobody seems to know just how many plots, nor how many acres are actually producing food or cover, in any state.

Table I

Shrub Lespedeza Plants Delivered and Plots Planted in Kentucky

Year	Plants (Thousands)	Good Acres	Per Cent Effective	Good Plots	Total Plots	% of Plots Good
1949	175	4*	19	34	105	32
1950	511	16*	26	116	264	44
1951	1,587	22*	11	191	489	39
1952	1,875	48	20	400	715	56
1953	1,616	29	14	268	540	50
1954	970	15	20	124	333	37
1955	936	38	32	306*	387	79
1956	1,300	57	35	365*	507+	72
Totals	8,970	229	..	1,804	3,340	..

* Calculated from other data. May be incorrect.

Table II

Seed and Rose Plants Distributed and Planted in Kentucky

Year	Plants or Pounds	Plots or Fences	Acres or Miles	Per Cent Effective
Rose:				
1949	19,000	18	....	.....
1950	531,000	70	....	.....
1951	721,000	261	....	.....
1952	1,081,000	581	....	.....
1953	1,773,000	491	140.7	48% of Plants
1954	877,000	188	26.4	16% of Plants
1955	1,907,000	...	108.5	30% of Plants
1956	346,000	...	31.0	48% of Plants
Sericea:				
1953	1,500	17	....	.....
1954	8,000	61	40.2	15% of Seed
1955	6,000	..	125.6	63% of Seed
1956	10,000	..	213.4	64% of Seed

TABLE II—*Continued*

SEED AND ROSE PLANTS DISTRIBUTED AND PLANTED IN KENTUCKY

Year	*Plants or Pounds*	*Plots or Fences*	*Acres or Miles*	*Per Cent Effective*
Sorghums:				
1955	4,000	..	98.7	*
1956	5,000	..	171.1	*
Korean Lespedeza:				
1955	1,000	20	16.8	33% of Seed
1956	6,000	..	208.0	69% of Seed

* Impossible to calculate because of difference between seeding rate of broadcast and row plantings.

In Kentucky, information on old plantings was gathered largely from questionnaires. Although it was inconclusive, and has been rather severely criticized, it did agree with other surveys in many respects.

For instance, the questionnaires indicated that poorest results were obtained in the Bluegrass area of the state. Average height was about a foot less there than in the rest of the state. Weed competition was greater, and quail used the plots less.

Our annual planting reports showed fewer plots in this area, with a higher percentage of failure. Conservation officers reports showed a lower percentage of seed mature before frost.

These questionnaires had several incidental advantages. An accompanying letter offered additional assistance, and advice on caring for the old plantings. Many of the returns requested more plants. It also implied the Department's interest in all the plantings. It would have been much more expensive, and probably impossible to send biologists and conservation officers around to talk to each cooperator every year. The cooperators' appreciation of this interest was shown by the high percentage of returns (about 30%).

Some data obtained from questionnaires are given in Table III. This survey indicated that shrub lespedeza was more efficient than multiflora rose. In 1952-53, 19 farmers reported bicolor seed in the crops of quail killed near plots. Only 18 reported good rose fences more than 4' high. The next year 42 farmers reported shrub lespedeza seed in quail crops, while only 31 reported rose fences actually holding livestock. Of course, a rose fence which will not turn livestock may benefit wildlife as much as one that will. But practically all rose plantings are made primarily for fences, and ineffective fences do not help to promote the use of multiflora rose.

TABLE III

DATA FROM SHRUB LESPEDEZA QUESTIONNAIRES

Year	*No. Mailed*	*No. Returned*	*Good Plots No.*	*Hunted*	*Quail Killed*	*Seed in Crops*	*Plots Used*
1951-52	271	125 (46%)	82	36	22 Plots	12 Plots	55
1952-53	591	113 (19%)	..	35	26 "	19 "	65
1953-54	1,302	409 (31%)	180	80	43 "	42 "	93
1955-56	300?	43	27	9	4 "	1 "	16

Of the 160 reports of good shrub lespedeza plots hunted, quail were killed from 95 (59%). This probably would compare favorably with other food plots, both natural and planted.

According to the Conservation Officers, 72 counties (60 per cent of the state's 120) had good shrub lespedeza plots, this fall. Quail had been killed from shrub lespedeza plots in 34 counties (28%).

Seventy-one counties (59%) reported rose fences which would hold livestock, although only 47 (39%) had fences which were actually serving as livestock barriers. This ratio between effective rose fences and effective shrub lespedeza plots probably is distorted. Usually one can tell by looking, whether or not a rose fence will hold livestock. But it is more difficult to determine that quail have been killed from a food plot.

D. Comparison of Different Techniques

With all the different types of plantings and other techniques there is a need to use the one most efficient in each case. Sometimes two or more kinds serve the same purpose. Sometimes they appear to serve the same purpose, but do not.

1. *Shrub Lespedezas:* Shrub lespedezas are probably the most controversial of all the plantings. It has been proven that quail eat the seed, and that they are a nutritive feed. But their actual value to quail is questioned.

Difficulty of establishment is another argument against shrub lespedezas, but this is greatly exaggerated. Only a little more effort is required to plant shrub lespedeza than to broadcast sorghum or Korean lespedeza. Bicolor plants are easier to plant than sweet potatoes or tobacco, and anyone who has farmed and handled plants knows that planting ⅛ acre of them is not difficult. Cultivation is not a difficult job unless the plot is allowed to get so weedy it needs hoeing. During wet years, and on some soils, cultivation is not necessary.

Shrub lespedezas are also quite persistent. Many plots rated as failures during dry years became productive when summer rainfall was abundant again.

It certainly costs more to produce a sorghum seed crop for 10 years than to produce a bicolor crop for 10 years. Some argue that the farmer is more likely to produce sorghum, because the bicolor requires more work at one time. It is also quite unlikely that many farmers would plant a sorghum patch for quail more than two or three years.

Probably the greatest advantage shrub lespedeza has is its psychological effect on the farmer. As Lay (1954) pointed out, it is a material package, obtained free. It is more attractive than plain advice, which he says is the biologist's most valuable gift.

In Kentucky, it cost the Pittman-Robertson Section about $65.00 for each cooperator in 1954. But the farmer does not see this. He only sees the five or ten dollars worth of plants, or the fifty cents worth of seed he obtains.

2. *Korean Lespedeza:* Korean lespedeza is a plant of proven value to quail, and one that can be grown easily. It is inferior to shrub lespedeza in several ways. (1) Even a good stand is soon choked out by plants higher in succession. (2) it represents to the farmer, a smaller contribution from the wildlife department, and (3) it is preferred to many other foods, hence may be eaten before it is really needed.

Since Korean lespedeza is easy to establish, reseeds for several years, and is a valuable food, it appears to be a valuable plant to use in definite wildlife plantings.

3. *Sorghums:* Sorghums are easy to establish, produce an abundant seed crop quickly, and are utilized during the hunting season, which makes hunters aware of the planting program.

Sorghums were not used much in Kentucky's program until 1955, and early reports were extremely favorable. The excellent seed crops were said to remain on the stalks all winter, and even part of the spring. It was thought that farmers could reseed the plot simply by disking under the seed that remained in the spring.

We examined about 15 of these plots in February and March, and caused a great deal of dismay and consternation. Those beautiful big black sorghum heads just did not contain seed! And when the plots were disked in the spring, a new crop of sorghum was not produced.

Sorghum seems to be a poor substitute for Korean or shrub lespedeza, which help to maintain quail brood stock in late winter, but it is an excellent tool to concentrate quail during the hunting season, and increase the kill. That is one of the criticisms which was made of bicolor, but in some areas it seems to be desirable.

There is one area in Kentucky, which should not be overlooked, and that is the McCracken County Field Trial Area. An excellent quail population was built up there, and sorghums were thought to be a very important factor.

4. *Game Bird Food Mixtures:* Another type of planting which shows promise is the mixtures of millets, sorghums, cowpeas, soybeans and other annuals used

in Virginia. This is just being started in Kentucky, but probably will be expanded during the next few years.

These mixtures have all the advantages of sorghums and Korean lespedeza, plus some of those of shrub lespedeza, and possibly some in addition to all of these.

Seed mixtures are like shrub lespedezas in that they are something the farmer cannot obtain conveniently except from the wildlife department. They are also more likely to be used in wildlife plots instead of pastures or meadows.

5. *Criteria for Judging Food Plants:* One of the most frequent criticisms of bicolor was that it was an exotic. In the first place, the regional farm game habitat improvement program is so inefficient already, that it seems quite extravagant to discard a practice on such an irrelevant excuse. And in the second place, if we do, we would also have to discard multiflora rose, sericea, the sorghums, Korean lespedeza, and the game bird food mixtures. And even then, quail would continue to utilize such exotic crops as corn, wheat, sorghum and Korean lespedeza.

The bicolor plot has also been pictured as a magnet which drew in all the quail from surrounding farms, and gave the impression of increasing quail, when in reality it was only shifting the birds with no actual increase. The contention was also made that the mere fact that quail utilized the plot did not indicate that they were benefited by the bicolor.

Two studies have tended to disprove these theories. In Alabama, Herring found that bicolor became an important food item only late in winter, when other foods are scarce. In Arkansas, Hunter found quail using bicolor borders six times as much as natural edges, in late winter. They also used bicolor more in late winter than during the autumn.

Blackwell (1955) also stated that quail used bicolor most in Virginia during January, February and March.

These studies indicated that quail utilization of shrub lespedezas was proof that it was needed.

On the other hand, how are you going to prove quail are benefited by a patch of sorghum, or game bird food mixture or Korean? How do you know that the quail would not be dispersed over a wider area eating something else, if the sorghum and Korean patches were not there? We know that they will utilize those foods even when native foods are plentiful. Bicolor is the only type of food patch which will pass these tests.

You might ask why we do not have more shrub lespedeza plots, if it is such a good practice. There would be disagreement on most of the answers, but everyone would agree that most of the biologists in Kentucky dislike shrub lespedezas. If habitat on private land is to be improved, they prefer to use exotic annual food patches rather than exotic perennial food patches.

III. STUDIES OF PLANTS

Plants used in the habitat improvement program are expected to do a specific job, just as are other agricultural plants, or crops. Research is now considered essential to all agricultural crops, although studies of wildlife plants have usually come as by-products of carrying out other objectives. So far in Kentucky, extensive studies of large numbers of plantings appear more reliable than intensive studies of a few plantings. There are too many factors which cannot be controlled with available time and facilities.

A. Adaptability of Bicolor to Different Areas of the State

During the past two years, shrub lespedezas have grown well in all areas of Kentucky. Considering the entire program, though, they have grown best in the eastern mountainous area. Poorest results were obtained in the northern (Bluegrass) Area.

Figure 1 shows the boundaries of these areas.

Table IV shows average height, survival and other growth characteristics in the areas.

Apparently these differences are caused primarily by soils.

TABLE IV

COMPARISON OF SHRUB LESPEDEZA PLOTS IN DIFFERENT REGIONS OF KENTUCKY

Region	*Average Height*	*Per Cent of Seed Mature*
Eastern	6′	76%
Central	5′ 5″	61%
Western	4′ 4″	71%
Bluegrass	3′ 9″	55%

B. EDAPHIC FACTORS AFFECTING SHRUB LESPEDEZAS

During the severe drought years, 51 soils were analyzed from good shrub lespedeza plots, or those which had had good care. Table V and Figure 2 show the results of these analyses. Since the past two rainy summers, these data are completely upset. They probably still are useful for dry years, though.

Nearly all plots on soils containing less than 42 per cent clay were good. Some plots on 42 per cent clay were good if the pH was less than 5.8. But where the pH was 5.8 or higher, and clay was 42 per cent or more, shrub, lespedezas made little growth, before the rains of 1955.

It was also difficult to establish shrub lespedeza plots, prior to 1955, on soils containing more than 170 pounds of phosphate per acre. From these analyses, we discontinued recommending lime, and recommended phosphate only where it was very low.

C. FERTILIZERS AND CULTIVATION

In 1954, data were obtained on the cultivation and fertilization of 98 shrub lespedeza and 131 rose plantings. Table VI indicates that fertilizer had little effect on the shrub lespedezas, whereas cultivation was quite beneficial. Cultivation and fertilizer were both beneficial to the rose plantings.

TABLE V

ANALYSES OF SOILS FROM 51 SHRUB LESPEDEZA PLOTS. THE FIRST 17 WERE FAILURES. SEE ACCOMPANYING CHART FOR CONDITION OF OTHERS

Name	*Phos.*	*Potash*	*pH*	*Clay*	*Colloid*	*Silt*	*Sand*
Howard	300+	Very Low	6.5	40.0	25.0	42.0	18.0
Case (1)	300+	Very Low	6.5	48.3	26.8	37.6	14.0
Mahan	300+	Very Low	5.9	44.0	21.0	45.0	11.0
Case (2)	300+	Very Low	5.5	47.4	30.4	36.7	16.0
Jamison	300+	Very Low	5.4	48.6	34.0	42.2	9.2
Frank Watts	300+	Very Low	5.4	42.6	25.0	48.2	9.2
Cosby & Wilson	300	Very Low	5.3	42.6	25.0	48.2	9.2
FCSC—C	120	Very Low	6.6	64.0	40.0	30.0	6.0
Pierce	45	Very Low	6.1	47.6	33.0	45.0	7.2
Raisor (1)	300+	Low	5.8	46.0	22.0	43.0	11.0
Aldridge	300+	Medium	6.3	57.0	39.0	35.0	8.0
Raisor (2)	174	Low	6.2	46.0	27.0	46.0	8.0
Jones	12	High	6.1	34.6	19.0	52.2	13.2
Avery	18	Low	6.3	49.0	37.6	27.8	23.0
Bernheim (L)	15	Low	5.5	47.6	29.0	44.2	8.2
Lunsford	30	Very Low	5.4	41.6	33.0	55.2	3.2
Rider	3	Very Low	5.8	51.0	35.8	38.5	10.5
Harrod	165	Very Low	5.5	49.0	33.0	45.0	6.0
Downs	165	Very Low	5.7	52.0	38.0	38.0	10.0
Wakefield	165	Very Low	5.6	50.0	32.0	46.0	4.0
Snider	75	Very Low	5.4	48.0	32.0	48.0	4.0
Miller	36	Very Low	5.5	48.0	32.0	45.0	7.0
J. D. Watts	12	Very Low	7.4	65.6	45.0	32.2	2.2
Griffin	9	Very Low	5.3	46.6	29.0	50.0	3.2
Lincoln	3	Very Low	5.4	50.0	34.0	46.0	4.0
Goebel	27	Very Low	5.2	51.0	36.0	47.0	2.0
Sid Caudill	9	Very Low	5.1	35.0	17.0	35.0	30.0
Dulin	12	Very Low	5.6	51.0	36.0	35.0	14.0
Roller	9	Very Low	5.0	53.6	34.0	43.2	3.2
Kidwell	165	Low	5.5	63.5	43.0	29.6	7.0
Drury	6	Low	5.4	48.0	34.0	52.0	0.0
Shureck	6	High	5.4	44.0	28.0	52.0	4.0
FCSC—S	69	Very Low	6.5	47.0	27.0	47.0	6.0
Roman	9	Very Low	6.2	33.6	21.0	57.2	9.2
Bernheim (S)	45	Very Low	5.5	36.6	23.0	52.2	11.2
Matney	36	Very Low	5.2	31.3	19.7	29.4	39.3
C. Brooks	126	Low	5.8	37.0	19.0	47.0	16.0
Bloyd	45	Low	5.3	35.8	26.8	25.3	41.0
Lusk	30	Very Low	5.4	38.6	25.0	56.2	5.2
Nunn	21	Very Low	6.5	25.0	13.4	39.3	35.6

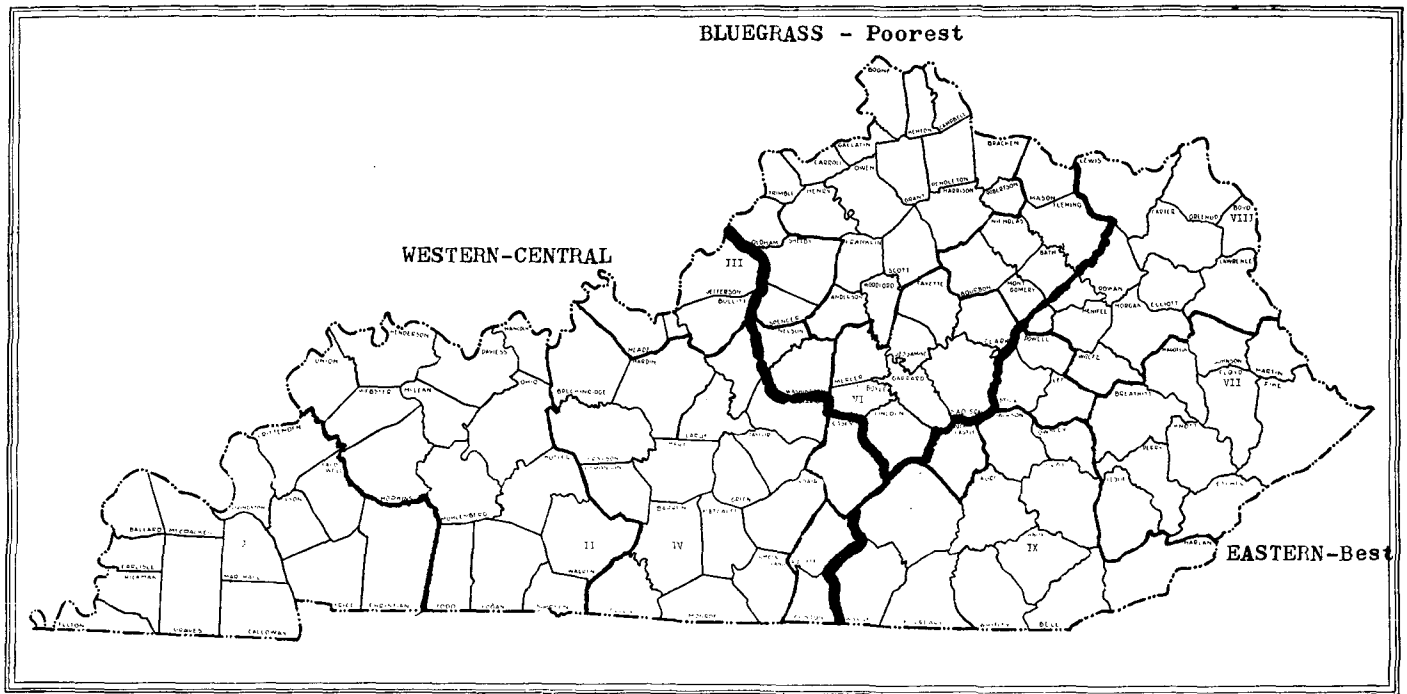

Figure I. Regions of Kentucky, to which shrub lespedeza has different adaptability.

TABLE V—*Continued*

ANALYSES OF SOILS FROM 51 SHRUB LESPEDEZA PLOTS. THE FIRST 17 WERE FAILURES. SEE ACCOMPANYING CHART FOR CONDITION OF OTHERS

Name	*Phos.*	*Potash*	*pH*	*Clay*	*Colloid*	*Silt*	*Sand*
Powers	12	Very Low	5.7	35.6	19.0	59.2	5.2
Roman (S)	12	Very Low	5.8	38.6	21.0	54.2	7.2
Brooks (48)	9	Very Low	5.7	27.0	16.0	39.3	33.8
Amos Caudill	6	Very Low	5.3	40.0	21.0	45.0	15.0
Popplewell	6	Very Low	6.0	36.0	13.0	48.0	16.0
Horton	3	Very Low	5.9	25.0	13.4	39.3	35.6
Riechenbach	9	Low	6.2	41.0	24.0	59.0	0.0
Snyder	9	Low	5.8	41.0	20.0	45.0	14.0
Bowling	3	Low	5.8	33.0	19.7	44.0	23.0
Hodges	3	Low	5.2	34.9	25.0	36.7	28.4
Brooks (49)	9	Medium	5.8	28.6	18.0	47.5	24.0

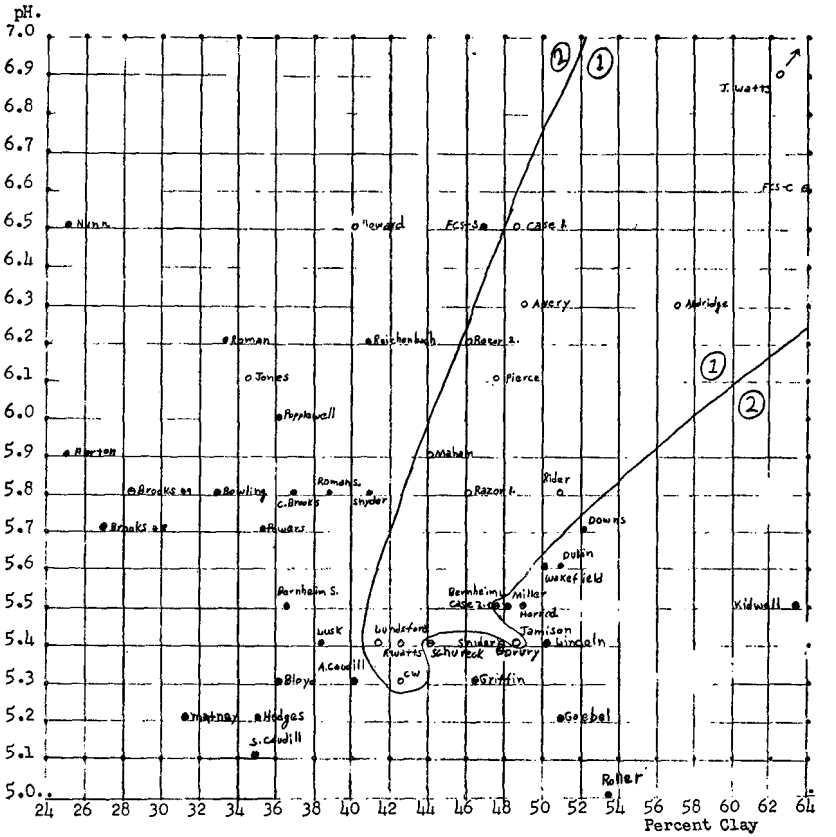

Fig. 2. Clay-pH Chart of Soil Samples from Shrub Lespedeza Plots

Section 1. All plots poor, despite excellent care.
Section 2. Most plots good, except near Section 1. Howard plot possibly adversely affected by phosphorous-potassium ratio. Jones plot suffered from competition.

● -- Good plot ⊖ -- Mediocre plot O -- Failure

TABLE VI

HEIGHT AND SURVIVAL OF FERTILIZED AND CULTIVATED PLANTINGS

	Fertilized				*Not Fertilized*			
	Av. Ht.	*Av. Surv.*	*Satis. Plots*	*Total Plots*	*Av. Ht.*	*Av. Surv.*	*Satis. Plots*	*Total Plots*
Japonica:								
Cultivated	22″	74%	6	8	22″	87%	14	16
Not Cultivated	14.5″	46%	4	12	13″	44%	14	62
Rose:								
Cultivated	17.6″	82.4%	7	7	17.8″	74.4%	17	25
Not Cultivated	12.6″	61.3%	12	19	9.1″	41%	16	80

TABLE VII

PER CENT OF GOOD PLOTS WITH AND WITHOUT CULTIVATION AND FERTILIZER

	Shrub Lespedeza		*Rose*	
	Fertilized	*Not Fertilized*	*Fertilized*	*Not Fertilized*
Cultivated	75%	88%	100%	68%
Not Cultivated	25%	22%	63%	20%

Close study of individual shrub lespedeza plots indicated that fertilizer was necessary to produce japonica lespedeza seed the first year a plot was planted. It probably would always be beneficial if the plot were kept free of weeds. Some plots in this study were cultivated only once, then allowed to get weedy again.

D. SHRUB LESPEDEZA SEED COUNTS

Shrub lespedeza seed production, rate of falling, and persistence on the ground were measured. Catch boxes indicated an average production of 158 pounds per acre in 1953, and a maximum of 800 pounds per acre in 1951. In April of 1953, 235 pounds per acre (432 seeds per square foot) were found in the Lusk plot. These undoubtedly were two years old, since the plot produced practically no seed the year before. Quail had used the plot the past winter.

This build-up of surplus seed is one of the most valuable attributes of the shrub lespedezas. Haugen (1953) described this as a sort of "ever-normal granary." Once a bicolor plot has come into production, quail can get the seed any month in the year, just for the scratching. A seed failure then would make no difference unless the ground were covered with deep snow for several days.

E. EFFECTS OF COMPETITION

Competition apparently does not kill young lespedeza plots if there is plenty of rainfall. During a dry year, competition often destroys young plots, especially in the Bluegrass area.

In old plots, competition reduces seed production, and delays maturity. Delayed maturity means that frost will kill some seed prematurely.

Table VIII shows the harmful effects of tall competition on survival, height and seed production.

TABLE VIII

EFFECTS OF TALL COMPETITION ON MATURE SHRUB LESPEDEZA PLOTS
(AVERAGE FROM 550 PLOTS)

	Survival	*Height*	*Seed Maturity*	*Seed Crop* *
Bicolor:				
Dense	66%	4.1′	48%	39%
Moderate	73%	5.0′	66%	49%
Light	79%	5.1′	70%	53%
None	82%	5.1′	73%	57%
Japonica:				
Dense	77%	3.5′	45%	33%
Moderate	78%	3.8′	53%	43%
Light	81%	4.3′	61%	52%
None	78%	4.4′	88%	80%

* Reports were weighted as follows: Heavy, 100%; Moderate, 67%; Light, 33%; None, 0%.

Apparently, once competition becomes firmly established in a young plot, it is useless to clean it out. The plants may become succulent, so that they actually

need the protection of the weeds. But the plants always do better if weeds are kept out in the first place.

F. Weather

Weather affects the survival and seed production of shrub lespedeza. During a wet growing season, plots become established on unfavorable soil, and with very little care. On the other hand, the bad effects of drought on new plots was almost entirely overcome by clean cultivation.

Apparently little can be done to alleviate the effect of drought on seed production. But this effect is not severe unless the drought is such that it kills native trees and common agricultural crops and pastures. Such a drought probably comes just once in a generation, but when it occurs, it may even kill some shrub lespedeza crops. After all, you cannot expect a newly introduced plant like shrub lespedeza to be very much better adapted to the state than the native vegetation and crop varieties developed for the state by the Experiment Stations.

Frost kills a fraction of seed prematurely in most bicolor plots in Kentucky. Conservation officers reported the following average percentage mature, at the time of the first killing frost:

1950	86%
1951	87%
1952	50%
1953	61%
1954	67%
1955	82%

A few japonica plots were included in these checks, and checks were made in only 11 counties in 1955.

G. Nursery Stock

In general, small plants cannot survive the haphazard care shrub lespedeza plants get. In one test 78 per cent of the large pencil-size plants lived, while only 23 per cent of the small match-size ones lived. Medium sized plants were almost as good as the larger ones. Wunz (1955) reported less difference in survival, but noted that more of the larger plants produced seed the first year. All these plants had good root systems. Frequently the digger cuts off most of the roots of larger plants.

Freshly dug plants were also superior. One district in 1955 reported 100 per cent survival from fresh plants, as compared to 50 per cent to 75 per cent survival from those dug in the fall and "heeled-in" all winter.

Plants "heeled-in" in sand kept better than those in sawdust. Those loose kept better than those tied in bundles.

The number of plants needed to plant one-eighth acre has been underestimated. Actually 2,000 instead of 1,000 plants are needed. Mathematical calculation of plants needed for a certain area, at a certain spacing is not accurate. Many undersized plots in Kentucky are due to the small number of plants delivered.

IV. METHODS

Getting farmers to carry out plans for habitat improvement is the toughest part of this type of program. Thus, information gained about methods of increasing efficiency may be more important than the plantings themselves.

A. Volume of Project

There has been difference of opinion as to just how big a plant distribution program should be. Administrators usually want a large number of plants distributed, while biologists usually want a smaller number, more intensively handled.

When we were permitted to cut down on the number of plants handled, we were surprised that it did not increase the percentage of plants utilized. We tried to pick four or five good cooperators per county, instead of 10 or 12, but we evidently picked the wrong men.

Actually it seems easier to get cooperation in a big program than in a little one. Most prospective cooperators want to know who else in the county is

participating, and a long list of names seems to encourage them. After you get 10 or 12 cooperators, it is usually easy to get 5 or 10 more. It is the first three or four that are hard to get.

Handling a large number of plants does not have to hinder intensive follow-up. There are several months before planting season, to work on plant distribution. Then during the planting season, it is easier to pick five good cooperators per county from a list of 15 than from a list of five.

It would be interesting to try hiring labor to care for plantings one year. The number of plants could then be reduced by two-thirds or more without decreasing the number of plots established.

B. Value of Follow-up Work

Follow-up visits have been one of the most controversial topics of the habitat improvement program in Kentucky. Biologists have been over-confident of their ability to make plans with a farmer in such a way that the farmer would carry them out without further attention. They contended that a biologist should spend his time making plans instead of going back to encourage the farmer to carry them out.

From 1949 to 1952, biologists who only made plans, with no follow-up visits, averaged 19 shrub lespedeza plots per year, while those who made follow-up visits averaged 70.

Excerpts from the Coordinators' 1955 report also show the value of follow-up visits. In one district, of the farmers who received rose plants, 83 per cent of those visited planted their rose, while only 40 per cent of those not visited planted.

These follow-up visits are now definitely assigned to the conservation officers. This probably is one reason for the increased percentage of good plots in 1956.

C. Value of Cooperating Agencies

Farm game habitat improvement programs are almost completely dependent on cooperation from county workers. It may be a conservation officer, soil conservationist, county agent, or any other local man. Farmers just do not follow advice from district men as well as from a county man.

This cooperation can only be attained through working agreements at the state and district level. The program in west Kentucky was a good example. It had been very poor before 1952. Before the 1952 planting season, we held meetings with SCS Work Group and Wildlife District personnel, to thrash out past problems, complaints and disagreements. Then, during 1952 we distributed more than a million plants in that quarter of the state, and the percentage of success there was just as high as in the rest of the state.

We do not have effective working agreements with agricultural agencies now, and the job is much more difficult. Before 1953, the SCS and the wildlife department were jointly responsible for the program. Now the wildlife department is completely responsible, and we go to soil conservationists and beg for help, instead of working as partners. As a result, most of the leg work is done by the Conservation Officers.

It is unfortunate that Conservation Officers are not recognized as agricultural workers in the county, because small game is primarily an agricultural crop. When agricultural meetings are called, practically every agency concerned with land management is invited, except the wildlife department. And if the wildlife department is invited, the invitation is sent to someone in the state office instead of the local officer.

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COTTONTAIL RABBIT PROPAGATION IN SMALL BREEDING PENS

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Most Wildlife Biologists and State Department Administrators realize that cottontail rabbit stocking is not a feasible management tool. Since 1950 the importation of wild rabbits into the State of Maryland has been prohibited, but the demand for cottontails is still present among certain groups. Those desiring cottontails for study purposes, beagle clubs, field trial operators, and unconvinced sportsmen are the mainstays of the above mentioned groups. All of these persons would like to have a few cottontails at specific times throughout the year. Because of this demand an experiment was initiated in 1955 to determine whether the cottontail could be produced in relatively large numbers in small outdoor enclosures. This experiment will continue for a 3-4 year period, at the end of which time it is hoped the numbers of rabbits and sex ratios which seem to be most productive in small pens varying in size from 1/16 to 1/4 acre will be determined. The Maryland Game and Inland Fish Commission does not intend to pen propagate rabbits statewide, but rather to release the best available information as a result of these experiments to individuals and conservation organizations interested in propagating rabbits for their own stocking or study purposes.

The results of the first year's experiments are as follows:

Four (4) open-top pens measuring 50′ x 50′, or approximately 1/16 acre were erected of 18-gauge, one-inch mesh wire, five feet in height. These pens were situated within a 70-acre enclosure of mesh wire which was encircled by an electric top wire. The large enclosure is also used in a rabbit propagation experiment. An electric top wire is necessary to exclude ground predators from entering the pens. The four (4) pens were located on a contour strip of planted white dutch clover. This contour strip was on a 45% grade affording good drainage. The clover comprised approximately 80% of each pen area with the remaining 20% in wild grasses affording good nesting cover. Three small brush piles of evergreen boughs and a feeding shelter were placed in each pen. The feeding shelter was constructed of sheet-tin covered with grass, supported six inches above the ground. High-protein commercial rabbit pellets and a pan of fresh water were placed under each shelter daily. The breeders were released in the pens in January, 1955, in order to allow them to acclimate themselves to pen existence before the breeding season.

One hundred and sixty-seven (167) young were produced from seven (7) females in the four pens for an average of 23 and 6/7 young per female. The sex ratio used and production per pen were as follows: