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7-1954

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Answers to Questions About Partridge Pea

T. H. GOODDING AND J. C. RUSSEL



Lincoln partridge pea, volunteer in oat stubble.

1. **What is partridge pea?** It is a native annual legume often seen in patches along roadsides. The flowers, which appear in August, are bright yellow. The seed pods are about 2 inches long, flat and slender, and leathery brown when ripe. They twist spontaneously and violently as they open. Thus they scatter seed for several feet. Seeds are black, thin, and four-sided, with dimensions of about 1 x 3 x 5 thirty-seconds inch. Their normal weight is 60 pounds per bushel.

Plants are erect and usually 1 to 2 feet high, but under cultivation they may grow 4 feet high. Leaves have the shape of miniature locust

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tree leaves. They fold at night and during rains. Plants are killed by the first frost, turn reddish brown and the leaves fall. Bare stems stand erect over the winter and catch and hold snow. New plants start from seed in April.

2. Who has interest in it? The Nebraska Agricultural Experiment Station has been working with partridge pea since 1944. Seed has been distributed for tests, and several farmers are now growing it. It is primarily a plant for soil conservation and soil improvement. Its values in comparison with other legumes have not been fully established.

3. Will animals eat it? Partridge pea is not commonly considered a forage legume, but animals do eat it. It is rarely found in pastures. Where it grows wild adjacent to pastures, it is missing for as far as animals can reach through a fence. Cattle on bromegrass pasture at the Agricultural College in 1951 and 1952 had free access to areas of partridge pea and vetch that had been seeded with oats. They were turned into the oats-vetch and oats-partridge pea in early June when oats were in the dough stage, and were removed after the first frosts. They left the bromegrass to eat the oats and vetch almost completely, and the partridge pea partially. In total they consumed about half of the partridge pea, mostly the tender top growth.

A 5-acre area of partridge pea in a Holt County hay meadow was fenced and pastured in 1951. Animals grazed the partridge pea so completely the first year that none of it went to seed.

Partridge pea is high in protein, as are other legumes. There are no known cases of bloat from grazing partridge pea.

4. Does partridge pea improve the soil? As a soil improver, partridge pea seems to be in the same class as Hubam sweetclover and Korean lespedeza. It is not as good as one full year of either biennial sweetclover or hairy vetch.

5. What growth does it make? Partridge pea is a vigorous plant. In yield tests it has produced from 1.75 to more than 4 tons of air-dry forage per acre. One test of volunteer partridge pea in oats at Lincoln produced yields as follows:

On July 6 when oats were combined, 1.03 tons per acre containing 40.7 pounds nitrogen.

On July 20 just prior to bloom, 2.15 tons per acre containing 63.7 pounds nitrogen.

On September 13, 8 days before seed harvest, 4.03 tons per acre containing 120.5 pounds nitrogen.

6. Is its improvement value in the roots or tops? The distribution of nitrogen in partridge pea is about 10 per cent in roots, 40 per



Stanton partridge pea, volunteer in oat stubble, Pierce Soil Conservation Demonstration Farm, August 10, 1951. The central crosswise strip is oat stubble without partridge pea. Any abundant material such as this helps to control wind erosion.

cent in seed, and 50 per cent in stems, leaves, and pods. It is a reasonable estimate that all of the nitrogen which the plant fixes from the air, and probably some of the nitrogen which it takes from the soil, is in the material above ground. Therefore, for partridge pea to have soil improving value, all of the stems, leaves and pods must go back on the land. Obviously its contribution to soil nitrogen is even greater when all seed can go back on the land.

7. What crop yield increases can be expected from growing it? Yield increases due to partridge pea will depend on the amounts of nitrogen put into the soil, and on management. Benefits may not be obvious by growing it only one year. Its effects are cumulative. Dead partridge pea material decomposes slowly.

Corn yields at Lincoln have been increased as much as 19 bushels per acre through the use of partridge pea. In the same seasons the increases in corn yield from biennial sweetclover were 35 to 40 bushels per acre. Wheat and rye yields have been increased by starting seedbed preparation when this legume was in the early bloom stage, but have not been increased when seedbeds were delayed for the removal of a seed crop.

Partridge pea growing with wheat or rye will not increase the yields of these grains but generally it will not decrease them. Where it grows with oats, partridge pea may decrease oat yields if the soil is poor, because it gets its nitrogen from the air and can outgrow the

oats. As a poor soil is made more fertile, this disadvantage would tend to disappear.

8. What are the advantages of partridge pea? This legume has a number of advantages.

a. It will grow on soils too strongly acid for sweetclover and alfalfa. Stands are easily obtained on eroded hillsides, bare clay spots, spill banks, borrow pits, earth dams, blowing sandy fields, and sandy blow-outs.

b. It has a wide range of adaptation. It is a wild legume from Goshen County, Wyoming, on the west, to Maryland on the east, and from northern Nebraska to Alabama and Georgia. It grows equally well on sandy and nonsandy land.

c. It is not eaten by grasshoppers or rabbits, so is usable in small areas where other legumes would be damaged.

d. It is a desirable plant for wild life.

e. It produces cover that is valuable for soil conservation.

9. How would partridge pea be used for soil conservation? It would be a volunteering, leguminous weed in grain fields and would produce more abundant growth in stubble after harvest than other, non-leguminous common weeds. Thus there would be more residue for stubble-mulch farming. The addition of nitrogen to the soil would tend to offset the loss of soil moisture caused by this plant.

10. Is there danger that it will become a troublesome weed? It is never troublesome in corn fields. If it does grow to any extent in the rows, or after corn is laid by, this can be considered an advantage since partridge pea is a legume. It is not viny, and not troublesome at wheat or rye harvest. In wet years or on poor soils it may overtop oats and be aggravating the same as sweetclover. It presents no danger as a seed contaminant except in some grasses, from which it can be easily separated. Its seed is formed too late to appear in wheat, rye or oats.

11. How does it fit into crop rotation? Once the crop is established it should be grown as a volunteer leguminous weed. Partridge pea should be satisfactory in any rotation in which it has a chance to go to seed as often as once in three years. One experimental rotation at the Agronomy Farm at Lincoln is alternate oats and corn. Partridge pea planted in 1945 has come up every year in the oats and has made abundant after-harvest residue and seed.

12. When and at what rate per acre is partridge pea planted? In Nebraska partridge pea should be planted in the spring. Any time between April 1 and May 15 is satisfactory. Seedling emergence begins about April 15 and continues to about June 1. Occasionally some seedlings come up in the late summer where it is shady and damp. As little as 5 pounds of seed per acre may be used by farmers who are



Lincoln partridge pea in oat stubble on sandy land at Pierce Soil Conservation Demonstration Farm, September 28, 1951. This heavy growth on the land over the winter would catch snow and conserve moisture.

willing to establish the stand at a slow rate. As much as 30 pounds of seed is necessary to get a dense stand the first year. Partridge pea normally has a high proportion of hard seed which may not germinate for two or three years. No present method of seed scarification is effective.

13. Does seed require inoculation? When partridge pea is to be planted on land where it has not previously grown, the seed should be inoculated. Soil from any planted or wild area of partridge pea may be used for inoculating purposes if nodules have existed there in abundance. Commercial cultures are more convenient. Partridge pea requires the same culture as cowpeas. On sandy land and eroded hillsides, it is helpful to use twice the recommended amount of inoculating material.

14. How should seed be planted? Partridge pea may be cross-drilled over wheat, or rye, with a grain drill set to penetrate and cover from 0.5 inch depth in heavy soil to 1.5 inches in sand. It may be mixed with oat seed, or drilled from a grass seeder attachment with oats. It may be broadcast with various types of equipment and then harrowed or treaded. The important thing is to get the seed covered so as to protect the inoculation from sun drying. Mixtures of seed and soil for inoculation are best applied with a lime distributor. Fall and winter plantings are wasteful of seed because the stands are poorer than from spring planting.

15. Are soil treatments necessary? On sandy blowouts, phosphate fertilizer should be used. This will increase nodulation on the roots,

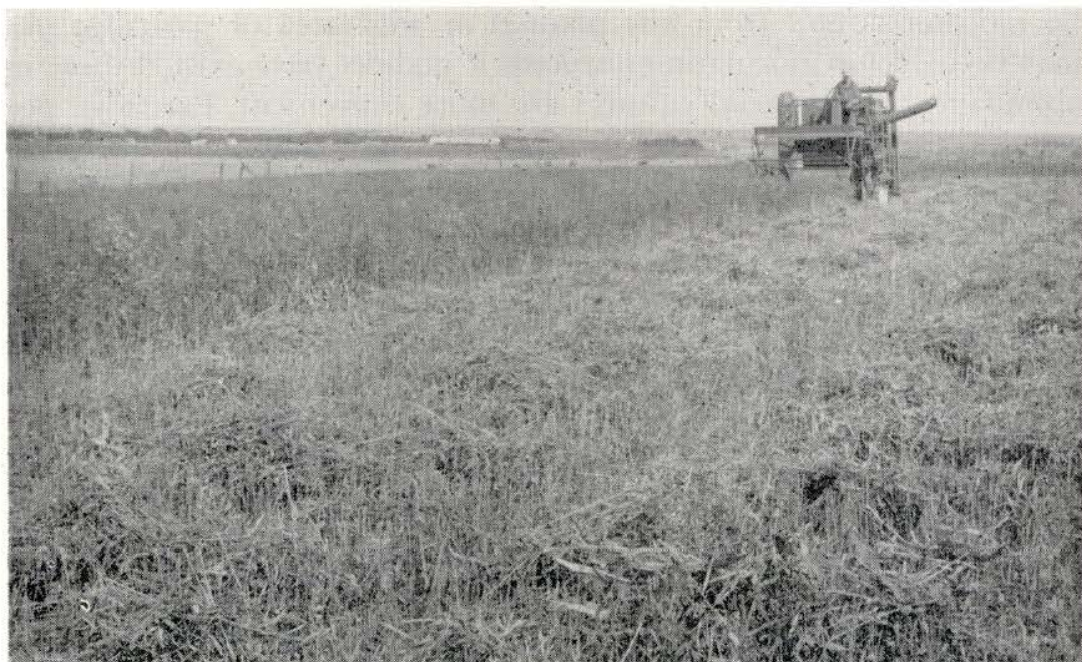
and plants will grow more vigorously. Partridge pea will tolerate soil acidity but will not eliminate the need for lime.

16. Are there different species and strains of partridge pea? There are several species of partridge pea. The native in Nebraska is *Chamaecrista fasciculata*, or the "showy" partridge pea. The Agricultural Experiment Station is now doing work with three strains—early, medium and late—identified by the county names Holt, Stanton, and Lancaster. Holt is small of growth and seed is ripe in Holt County, where this strain originated, about September 1. Lancaster is large of growth and seed is ripe at Lincoln about September 25. Stanton is intermediate in growth and seed is ripe in Stanton County about September 15.

The Lancaster strain, so-called because it has been grown at Lincoln since 1945, originated from seed collected in Riley County, Kansas, by the Soil Conservation Service Nursery Division at Manhattan.

Wherever Holt, Stanton and Lancaster have been planted side by side, they have performed very differently. Lancaster is the most desirable of the three from the standpoint of growth and soil improvement, but Holt probably is best for sections where frost comes early. Stanton is recommended over Holt wherever the length of season is at all favorable for it.

17. Where may seed be obtained? The present seed supply of Holt is limited. Stanton and Lancaster seed are available to the extent



Combining partridge pea at the Agronomy Farm, Lincoln.

of about 6000 pounds. Growers' names and prices will be furnished on request.

18. Can a farmer produce his own seed? Partridge pea seed ripens unevenly, and when pods become ripe and dry they split open and throw their seed. If the weather is cloudy and damp at ripening time, a high proportion of pods may ripen but not split. By getting into the field at a time of day when pods are slightly tough, a large portion of the seed may be harvested with a combine, sometimes as much as 75 per cent but usually not more than 50 per cent.

If seed is nearly ripe and is caught by frost, the pods should be watched for several days as they dry. At a dry pod stage just before splitting, much of the seed may be harvested with a combine. If sufficiently advanced before frost comes, frosted seed may have a higher percentage germination and a lower percentage of hard seed than seed that is fully matured.

Those who want maximum seed yields should not depend on combining. Maximum seed yields are obtained when a crop is harvested green with a large proportion of pods just turning brown, and with seed inside just beginning to show speckles of brown. This involves binding and special methods of handling which would be practiced only by specialty seed growers.

A farmer may mow partridge pea at this binder stage and gather up the green material and spread it over any other field where the legume is wanted. This is a good practice for sandy blowouts where the residue cover is important. Combining, however, is probably the better practice, even if less seed is obtained, for then the straw remains on the land. Total seed yields should range from 100 to 600 pounds per acre.¹

19. What is the effect of partridge pea on weeds? Partridge pea has a remarkable capacity for smothering out weeds. It does this partly because of its dense leaf system, and partly because it can outgrow the weeds through its use of atmospheric nitrogen. Numerous experiences indicate that on sandy land, partridge pea will crowd out sandburs, foxtail, cockleburs, and to some extent sunflowers.

20. What value does partridge pea have when planted with grass? Partridge pea in a grass seed mixture, or planted in rundown grass with a grain drill, will grow readily and vigorously, thus adding to immediate ground cover and aiding in the control of runoff or wind erosion on clayey or sandy lands. The ultimate effects on quantity

¹ The Pierce Soil Conservation Demonstration Farm harvested about 3 acres of Stanton partridge pea in 1952 with a steel rasp type of combine. The harvested material consisted of a mixture of ripe, green, and many broken seeds, and seed-filled green pods. The mixture had to be spread in the sun to dry. Recovery was well over 75 per cent of the total.

and quality of grass vegetation are not well enough known to warrant specific recommendations.

21. What are the tillage and management practices with partridge pea? Objectives are maximum soil improvement and conservation with minimum complications and costs. Stubble land which goes to corn need not be touched until after viable seed of partridge pea has formed. Then it should be subtilled or ripped 4 to 6 inches deep if equipment is available. Otherwise it may be left until spring. Animals, however, may have the run of partridge pea land from grain harvest until spring. Spring work for corn should be started just as soon as partridge pea seeds begin to germinate. Subtilling will give maximum soil and moisture conservation. Maximum soil improvement results from plowing under.

22. Is partridge pea the long wished-for legume for western Nebraska dry-land agriculture? No one knows. It is deserving of trial. An early maturing strain like Holt or one developed locally from native partridge pea can be expected to grow and persist in any rotation where it is the rule for weeds to appear in stubble after harvest. An example of such would be a rotation of winter wheat, spring grain and summer fallow, in which partridge pea should appear in the spring grain.

It probably would not fit in the prevailing rotation of winter wheat and fallow in Dundy, Chase, Perkins, and Keith Counties and from there west. It may become increasingly desirable in this rotation in counties east of the wheat and fallow area.

Partridge pea would not be a pest in wheat production as is trailing wild bean, or as feared in the case of winter vetch. It probably should be regarded more as a producer of residue for improved efficiency of mulch-protected summer fallow than as a supplier of nitrogen drawn from the air. Thus it would be a supplement to, but not a substitute for, nitrogen fertilizer.

This circular is a contribution by the Department of Agronomy, Nebraska Agricultural Experiment Station, and Soil Conservation Service Research, U. S. Department of Agriculture. It was prepared by T. H. Goodding, Professor of Agronomy, University of Nebraska, and J. C. Russel, Soil Conservationist, Agricultural Research Service, Soil and Water Conservation Research Branch, U.S. Department of Agriculture. Photographs were provided by F. L. Duley.