SOME DATA ON *CASSIA TORA*

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Laymen have assumed that all legumes are capable of fixing nitrogen when inoculated with the proper nitrogen-fixing organisms. This process is dependent on there being an organism which will work symbiotically with the particular legume. In general if the right nitrogen-fixing organism is present, nodules will be produced on the roots of the legume. However, there are some legumes on which nodules are not produced or, at least records would indicate, none have been found. *Cassia tora* is such a legume. Parks (1937) reported nodules for this legume, but it appears that there may have been a mistaken identity, since Leonard (1942), Ligon and Nation (1945), and others have been unable to obtain nodules in some extensive inoculation studies with the plant.

That no nodules are found on a legume is not definite proof that nitrogen is not being fixed. It does create considerable doubt however. It can also be stated that the presence of nodules does not prove that nitrogen is being fixed in all instances because there is the possibility of parasitism. Allen and Allen (1933) attempted to demonstrate the occurrence of symbiotic nitrogen-fixing bacteria within the tissues of *Cassia tora* but with negative results.

Leonard and Reed (1930) in some green-manure studies in Mississippi reported that *Cassia tora* produced more dry matter than the other legumes used and that it had a higher nitrogen content. They observed however that fall-sown oats following *Cassia tora* exhibited a light-green color the following March while oats succeeding other legumes were dark green in appearance.

Cassia tora grows well on sandy soils in central Oklahoma according to data obtained at the Experiment Station Farm. Records indicate not only that it produces a large tonnage of forage but that it is rather drouth-resistant and produces a good seed yield. Yields of as much as 20 bushels of seed per acre have been secured. The seed scatters profusely and volunteer stands are common. These may or may not be considered desirable characteristics. The plant is an annual. Parks reports that it is the most-common weed on the sandy soils of east Texas and that it would appear to be a very desirable plant for green-manuring purposes on these soils.

Because of its drouth resistance and yielding ability, comparative data for it and Rokusun soybeans and golden mung beans are given. No forage yields were taken, but observations indicated that it would probably yield more forage than either the soybeans or mung beans.

Approximately 50 plants of each of these legumes were harvested on October 21, 1947. They were all at about the same stage of maturity. The first seed pods were mature, and on each of the plants several green pods were present. The weather during the summer and fall was very dry and somewhat-above-normal temperatures prevailed. These conditions limited growth and, particularly, seed production. Some of the plants were used in their entirety while a number of them were divided into stem, leaves, and seed pods. All of the samples were oven-dried, ground, and analyzed for nitrogen by the usual Kjeldahl method. The data are shown in Table I.

TABLE I

Showing composition of Cassia tora, *soybean, and mung-bean plants at near maturity*

Legume	Portion analyzed	Relative percent of plant	Nitrogen[a] (percent)
Mung bean	whole plants	100	2.27
	stems	52	1.96
	leaves	34	2.45
	seed pods	14	3.42
Cassia tora	whole plants	100	1.88
	stems	50	1.00
	leaves	16	2.65
	seed pods	34	2.68
Soybeans	whole plants	100	2.20
	stems	54	1.92
	leaves	36	2.11
	seed pods	10	3.84

[a]Dr. M. J. Plice assisted in the nitrogen determinations.

DISCUSSION

The data show that, at the stage of maturity selected, *Cassia tora* had a slightly lower nitrogen content than either mung beans or soybeans. The plant as a whole however had a high nitrogen content.

When different parts of the plant are considered it can be observed that the stems made up one-half or slightly more than one-half of the total dry weight for each legume. The percentage of nitrogen in the stems of *Cassia tora* was only approximately one-half that of either the soybean or mung-bean stems. This would indicate a higher crude-fiber content for *Cassia tora* stems which in turn could decrease the rate of nitrogen release through decomposition. This might explain the light-green color of the oats crop observed by Leonard and Reed. Again, a lower decomposition rate of the stems might be a valuable characterisitic when the plant is left largely on the surface of sandy soils as in residue farming for wind-erosion control.

The data for the leaves show a high nitrogen content for each of the legumes. There were fewer leaves in proportion to the total weight on the *Cassia tora* plants than on the other legumes. It should be stated that there is a possibility that slightly more of the leaves had dropped from this legume than from the others and the leaf data may be in slight error. Some leaves had been lost at this stage of growth, however, from all of the legumes.

As to seed production, the soybeans were handicapped more by the dry summer than were either the mung beans or *Cassia tora*. It appears that the latter two legumes are much more capable of seed production under drouthy conditions than soybeans. As reported the seed pod includes both seed and pod. The data show a lower nitrogen content for *Cassia tora* than for the other legumes.

LITERATURE CITED

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