

**U. S. DEPARTMENT OF AGRICULTURE.  
BUREAU OF PLANT INDUSTRY-BULLETIN  
NO. 267;  
NONPERENNIAL MEDICAGOS: THE  
AGRONOMIC VALUE AND BOTANICAL  
RELATIONSHIP OF THE SPECIES**

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**ROLAND MCKEE & P. L. RICKER**

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B. T. GALLOWAY, *Chief of Bureau.*

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# NONPERENNIAL MEDICAGOS:

THE AGRONOMIC VALUE AND BOTANICAL  
RELATIONSHIP OF THE SPECIES.

BY

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF PLANT INDUSTRY,  
OFFICE OF THE CHIEF,  
*Washington, D. C., September 19, 1912.*

SIR: I have the honor to transmit and to recommend for publication as Bulletin No. 267 of the series of this Bureau the accompanying manuscript entitled "Nonperennial Medicagos: The Agronomic Value and Botanical Relationship of the Species," prepared by Messrs. Roland McKee, of the Office of Forage-Crop Investigations, and P. L. Ricker, of the Office of Taxonomic and Range Investigations. The botanical descriptions have been prepared by Mr. Ricker and the remainder of the bulletin by Mr. McKee.

This paper gives the results of an investigation of a large number of species usually known as bur clovers, mostly secured with the assistance of the Office of Seed and Plant Introduction. These species have been extensively tested in California and to a less extent in the Southern States in order to ascertain their agronomic possibilities in comparison with three species already grown in the United States.

The increasing importance of these plants for pasturage and green-manuring purposes throughout the areas mentioned makes the paper a timely contribution to our knowledge of the possibilities of this group of forage plants.

The illustrations for Plates V to XV, inclusive, are from photographs by Mr. E. L. Crandall, except the drawings of seeds on Plates VI and IX, which were made by Prof. F. H. Hillman.

Respectfully,

B. T. GALLOWAY,  
*Chief of Bureau.*

HON. JAMES WILSON,  
*Secretary of Agriculture.*

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## NONPERENNIAL MEDICAGOS: THE AGRONOMIC VALUE AND BOTANICAL RELATIONSHIP OF THE SPECIES.

### INTRODUCTION.

The genus *Medicago*, as commonly accepted by botanists, includes about 7 perennial species, with about 16 subspecies, of which alfalfa is the best known and most important, and about 37 annual species, with about 80 subspecies, one of which, yellow trefoil (*Medicago lupulina*), has also a biennial or possibly perennial form. The duration of several—at least three—species is uncertain. There is considerable difference of opinion among botanists as to the number of annual species, mostly known as bur clovers. In 1873 Urban<sup>1</sup> recognized 39 such species, with 64 subspecies, since which time 3 other species and 17 additional subspecies have been described.

In this paper agronomic and botanical notes are given concerning 14 species and 9 subspecies which have been studied for two to five years.

Three species are more or less cultivated or established in the United States, namely, toothed bur clover (*Medicago hispida*) and its subspecies, principally on the Pacific coast; spotted bur clover (*M. arabica*), mainly in the Cotton States and in California; and yellow trefoil, or black medic (*M. lupulina*), more or less abundant throughout the United States. By far the greatest amount of agronomic information at hand concerns these three species, and the desirability of utilizing any of the other species will depend largely on whether they exhibit any points of superiority.

All the annual medicagos grow under natural conditions as winter annuals, and under cultivation they succeed best when planted in the fall. Yellow trefoil is the only hardy species; other species can be successfully grown only where the winters are not too cold.

In the various sections where bur clovers grow somewhat extensively most of the plants are usually of one species or subspecies. In California toothed bur clover (*Medicago hispida denticulata*) is most widely distributed. *Medicago arabica*, *M. hispida confinis*, and *M.*

<sup>1</sup> Verhandlungen des Botanischen Vereins der Provinz Brandenburg, bd. 15, 1873, pp. 1-85, pls. 1-2.

*hispidia apiculata* are also found in that State, but to a more limited extent. The wide distribution of *Medicago hispidia denticulata* in California is partially explained by its natural adaptation, but perhaps more by the fact that it is the most widely introduced species, whether intentionally as pure seed for sowing for pasturage or green manuring or unintentionally as a mixture with other seed. *Medicago hispidia*, *M. hispidia apiculata*, and *M. hispidia confinis* were in all probability introduced into California along with *M. hispidia denticulata*, with which they are found nearly everywhere, but in lesser quantity.

Spotted bur clover (*Medicago arabica*) is apparently of more recent introduction into California than *M. hispidia denticulata* and is far less widely distributed in that State. On the creek pasture lands on the Bidwell ranch at Chico, *M. arabica* is more often found than *M. hispidia denticulata*. To judge from the quantity there, it was perhaps first introduced at this point and has been distributed thence to various parts of the Sacramento Valley, where it is found in small areas. According to Mrs. Katherine Brandegee, as reported by Mr. Willis L. Jepson,<sup>1</sup> *Medicago arabica* is almost as common as *M. hispidia denticulata* in San Francisco County. *Medicago arabica* is the commonest species throughout the South Atlantic and Gulf Coast States east of the Mississippi River and succeeds exceptionally well throughout this section. It can stand lower winter temperatures than the toothed bur clovers (the *M. hispidia* group), and for this reason is better adapted to this section, in which the toothed bur clovers more often winterkill. It is practically the only species used for pasturage or green manuring in the Southern States. *Medicago hispidia denticulata* and *M. arabica* succeed well in Texas, the former species being the more generally distributed.<sup>2</sup>

Yellow trefoil (*Medicago lupulina*) occurs throughout the greater part of the United States, and on account of its hardiness is adapted to sections farther north than either *M. arabica* or *M. hispidia* and its forms.

#### SOIL AND MOISTURE REQUIREMENTS.

Toothed bur clover and spotted bur clover succeed under varied conditions as to moisture, soil, etc. In California, as well as in the South, they grow on all types of soil from nearly pure gravel to heavy adobe. They do better on the heavier loam soils, but will grow in almost any soil containing sufficient moisture. They make a fair growth even under rather arid conditions. In the dry foothill pasture lands of California the toothed bur clover makes a valuable

<sup>1</sup> Jepson, W. L. Flora of Western Middle California, 1901, p. 313.

<sup>2</sup> Bulletin 108, Texas Agricultural Experiment Station. 1908.