

The Argentine Literature on Range Management¹

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A LARGE part of Argentina is dry rangeland, and consequently many Argentine problems in management are not far different from those of the western United States. For this reason it is of interest to note an increasing body of literature in that country dealing with these problems. Because these articles are in unfamiliar journals, in an unfamiliar language, and come from a far-away country, it is easy for American technicians to overlook their importance.

As a whole, the Argentine flora is less well known than that of North America. This generalization, however, may not hold either for grasses or for legumes, the two important groups of forage plants, because each of these families has interested, in Argentina, an able and diligent worker and the groups are now well ordered.

The work of Burkart, as summarized in the second volume of his book on Argentine legumes (Burkart, 1952), has been reviewed in the *Journal of Range Management* (Beetle, 1952). As pointed out by Tomé (1953), Burkart had an important influence on early experiments in alfalfa breeding in Argentina, a country whose alfalfa production rivals that of the United States. Parodi has an equal or greater volume of work on Argentine grasses. These two men have set a pattern for basic research with broad interest in applied fields which is being widely and advantageously copied in Argentina.

Parodi branched away from clas-

sification when publishing on the delimitation of floral regions (Parodi 1945) and on poisonous grasses (Parodi, 1950). About 20 species with toxic properties are listed, the most important of which are: Bermuda grass, *Cynodon dactylon* and *C. hirsutus* Stent. (a very close relative); two fescues, *Festuca argentina* (Speg.) Parodi and *F. hieronymi* Hackel; two bluegrasses, *Poa holciformis* Presl and *P. huecu* Parodi; and several needlegrasses including *Stipa bomani* Hauman, *S. venusta* Philippi, and *S. saltensis* O. Ktze. (Argentines normally refer to their grasses as "pasto", good grass, and "pasto durro" or "paja", unpalatable species, but do not have a vast store of common names similar to that found in the United States.) Parodi emphasized the importance of exact determinations and sufficient protection of valuable grasses so that their propagation will assure good forage for animals in such quantities that grazing of poisonous grasses in the same pasture will be minimized.

Following this pattern, taxonomist Ragonese has published a definitive ecological paper on a salt-desert area of central Argentina (Ragonese, 1951; see also Ragonese and Covas, 1947) and with Castiglioni has recognized changes in vegetation due to grazing (Ragonese and Castiglioni, 1951). Another of his papers deals with the value of "pasto romano", *Phalaris minor*, as winter forage (Ragonese and Marco, 1943).

Two Argentine workers have published on the North American flora. One studied the annual vegetation of California coast hills

(Bignoli, 1947a); the other (Covas, 1949) is responsible for the changing of the name of meadow barley from *Hordeum nodosum* as listed in the first edition of Hitchcock's *Manual of the Grasses of the United States* (1935) to *Hordeum brachyantherum* as it is listed in the second edition (1951).

Bignoli, who first studied the California flora, has since studied in Great Britain, and has been actively testing forage species in Argentina. These studies include a privately published guide (Bignoli, 1948a) to the important species, including the "pasto romano" referred to above, as well as the little-known black sorghum, *Sorghum almum* Parodi, a new United States introduction from Argentina (Beetle 1953) which is sure to be of increasing agricultural importance in many parts of the world. This handbook contains plans of management for both natural and planted meadows. Bignoli has also found that early defoliation of lucerne in the seedling stage has a profound influence on the vigor and size of seedlings (Bignoli, 1950) and consequently such injury affects establishment of lucerne leys. Preliminary studies were made on characteristics of growth, form, color and tillering habit of nine varieties of alfalfa (including Grimm and Ladak) and it was found that the varieties showed differences during the seedling stage in total height, internode length, leaf shape, leaf size, pubescence, growth habit and number of tillers (Bignoli, 1951a). In submitting alfalfa to low temperatures it was found that the radicle was more susceptible to injury from cold than the cotyledons (Bignoli, 1951b). In a study of the seeds of *Bromus catharticus* (cebadilla criolla to the Argentines but rescuegrass to the English world), it was found that the presence or absence of lemmas strongly influenced the germination of seeds. Lemmaless seed had the best germination but

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the method of removal was of great importance (Bignoli, 1953).

Taxonomist Boelcke, who has special interest in the mustard family, has reported on the commercial collection of seeds of both white clover and rescuegrass (Boelcke, 1951b). The importance of the use of good seed from adapted varieties of pasture plants in the establishment of permanent stands was emphasized in a study of the value and behavior of commercial forage mixtures for permanent pastures in the Pergamino region of central Argentina (Boelcke and Echeverria, 1949).

Finally, attention is called to the significant papers of Soriano, whose interest has lain principally in the southern Patagonian regions of Argentina. He first proved himself a taxonomist along with the others (see Soriano, 1947) and then reviewed the history of the exploration of this region (Soriano, 1948). Now his interest has turned to analysis of the vegetation, the first of this series being an ecological description of the distribution of the vegetation of Patagonian Chubut (Soriano, 1950). Of more immediate interest to range managers are two other papers, one dealing with grazing conditions in Chubut, describing the grazing capacity of the different plant communities, with notes on noxious and poisonous species and on the palatability of grazed species (Soriano 1952a). The other deals with the possibilities of changes in the vegetation of Patagonia as a result of changes in management which will allow for ecological succession toward climax (Soriano, 1952b).

The work of research is reaching the operators in Argentina. Although many more extension men are needed in the field, and although too many specialists are concentrated in Buenos Aires, it may be seen from the following suggestive list that there are many popular articles in a variety of popular

magazines bringing up-to-date range and pasture information to the people (see selected popular references in bibliography).

This work is that of young and able research workers. North Americans can expect research south of the border to increase in volume and importance in the years to come and that from arid Argentina will be of particular significance to people in similar areas elsewhere in the world.

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COMING EVENTS

- June 8-10.** Western Grass Breeder Conference, Oklahoma A & M College, Stillwater, Oklahoma
- June 21-24.** Agricultural Institute of Canada, annual meeting, Macdonald College, Quebec
- June 21-24.** Western Society of Soil Science and Western Branch of American Society of Agronomy, annual meeting, Washington State College, Pullman, Washington
- July 11-14.** Western Section of American Society of Animal Production, annual meeting, Oregon State College, Corvallis, Oregon
- July 21-22.** Western Section of Canadian Society of Animal Production, annual meeting, Kamloops, British Columbia
- July 26-28.** Western Farm Economics Association, annual meeting, Estes Park, Colorado
- Sept. 5-9.** American Institute of Biological Sciences, annual meeting, University of Florida, Gainesville, Florida
- Nov. 8-12.** American Society of Agronomy and Soil Science Society of America, annual meeting, St. Paul, Minnesota

AN EVALUATION OF FORAGE PRODUCTION UNDER VARIOUS DENSITIES OF OAK WOODLAND

(Abstract of thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in the Department of Range and Forestry, A. and M. College of Texas, College Station, May, 1953.)

The production of forage following various degrees of thinning in an oak woodland was evaluated in an experimental study in the East Texas Post Oak Belt near College Station, Texas. Although this woodland type is not important as a source of forest products, clearing by mechanical or chemical methods has been effected by landowners to obtain increased returns from crop or native forage production.

Twenty 1-acre plots in a randomized-block design were subjected to five thinning treatments varying from complete removal to control with no treat-

ment. Vegetational inventories made prior to treatment in 1951 consisted of stem-diameter and cover degree of the woody canopy, basal density of forage plants by the line-intercept method, and forage production on 9.6 square-foot plots.

Thinning treatments were effected by basal and frill applications of 2,4,5-T ester or amine.

Little bluestem comprised 70 to 85 percent of the forage plant cover before and after treatment. Basal density of the herbaceous cover was reduced nearly 43 percent on the control plots in the year following treatment due to severe drought conditions. However, little or no change in density occurred under complete removal of the canopy.

Forage production from the control plots was 212 pounds per acre in 1952

as compared with 479 pounds in 1951. With complete canopy removal, forage production was 1,168 pounds per acre in 1952, representing a five-fold increase due to thinning.

In 1952 following treatment, utilization of the principal forage plants by livestock showed an inverse relationship to the degree of thinning or canopy removal effected. The degree of use varied from 6 to 74 percent.

Costs of the total thinning treatment could be amortized in less than four years on the basis of utilization of 50 percent of total forage produced and hay at \$30 per ton. Annual returns from forage production on control plots were valued at \$1.59 per acre; with complete canopy removal, returns were \$8.76 per acre.

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