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Investigation and cartographic method for tropical pastures applied at the breeding and veterinary medecine Institute of tropical countries.

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SECTION 15

INVESTIGATION AND CARTOGRAPHIC METHOD FOR TROPICAL PASTURES APPLIED AT THE BREEDING AND VETERINARY MEDECINE INSTITUTE OF TROPICAL COUNTRIES

(Institut d'Elevage et de Médecine vétérinaire des Pays tropicaux)

by G. BOUDET

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According to the schedule of our public organisation, the pasture specialists have to clear up a number of breeding problems :

- value the potential pasture ressources of certain steppic regions of the Sahel (south of Sahara), in order to define the number and distribution of watering places likely to enable optimum exploitation of said pastures ;

- keep the pastoral potential in high nomad breeding, so that the erosion as well as the settlement of a forest should be kept within reasonable limits ;

- define the pastoral possibilities and the exploitation techniques of the until now uncultivated savannahs of Subguinea.

In order to solve these problems, we have to :

. define the vegetal groups or group concentration ; for this purpose a specialist of tropical floristic joins the work team.

. seek their forage value and the best cultivating conditions.

- express assumptions concerning the evolution of definite cultivation types ;

- finally, we have to make maps of these groups in order to specify their comparative importance and their distribution.

1°) Investigation of vegetal groups

The ground investigators are learned phyto-sociologists. They use the vertical air-photographs so as to prepare their prospection and usually apply the 1/50.000 scale.

The air-cover specifies the open places where the most profitable studies might be achieved.

The juxtaposition of many facies is particularly marked. In these zones, the prospector makes locations which have to go accross as many facies detected on photos, as possible.

These photographic facies are located by the variations of colours, the physiognomy of the ligneous layers and mainly the features of the relief.

In every facies, the prospector makes phytosiological statements using a scale of abundance-dominance upon vegetation types the features of which are homogeneous.

He thus defines a number of vegetation facies which can be compared by their flora and the plenty of each species.

These elementary vegetal groups are than characterized by the ecologic conditions under which they appear :

Topographic distribution, soils type (sandy, clayey, fine gravel, iron-clad), water management (temporary inundations, permanent temporary or no stoppage).

In general, the ecological conditions of the vegetal groups are closely connected to the topographic position of the stations and one might set up vegetal group series bound to the hill-shading of the relief.

2°) Cartography of these groups as pasture-land types.

The various vegetal groups defined by the above method, could be mapped by photographic interpretation as far as those groups might be connected with geomorphological criterions.

These criterions expressed by the shape of the relief, are completed by the features of photographic colours which are often connected with the water distribution as well as by the photographic features of the ligneous layers.

Before drawing general conclusions and mapping by interpretation of the photos, the relations between the photographic criterious and the pasture-land types are checked on the ground by a series of borings.

However, the pasture cartography gets hazardous in cultivated regions and in that case, one might merely map the vegetal group of origin, and specify that man's action is ruining it and that it presently is in a more or less accelerated development cycle.

This development cycle is described in the attached account.

3°) Fodder value of these pasture-lands

The fodder value of the above defined pasture types is specified by three criterions :

a) Statistic study of the vegetation

The comparative frequency and initial flora of the species at 5 cm hight from ground, are investigated upon interception bands, distributed at random. On sahelian steppic formations and on fallows of the Soudan, the interception bands are substituted by squares of 50 cm sides where all individual of every species are counted (this technic is more advisable for the annual species with only one stubble).

The statistic comparison (χ^2) of a number of parcels enables their development compare, according to different cultivations.

b) Bromatologic Study

On specific parcels of various pasture types, lots of 5 metres side are delimited and reaped at pasture hight, when the vegetations growth has reached its optimum of exploitation per animal (20 to 30 cm for the low species, 50 cm for the high species, such as Andropogoneae).

This technic enables an estimation of optimal rest time between two grazings during the dry season and the rains season, as well the possible productivity if these rest periods are duly kept.

The chemical analysis of an aliquot sample of the obtained harvest, specifies the forage composition (percentage of dry substance, forage unities and digestible proteinic substances).

The results recorded have allowed the outline of cultivation rythms with grazing/ha, considerably superior to waste pasture ; thus the pasture lands of the Soudan zone, with Andropogon gayanus on temporary hydromorphic soil, could feed a bovine of 250 kg/ha, if keeping a rest period of one month during the rains season and of two to three months at the dry season, according to the harshness of the latter ; in waste pasture, with uncontrolled running fires, six hectares are necessary for each animal.

c) Research of oligo-elements

In the frame of achieved prospections, we have also investigated the oligo-elements' composition of the forages.

Carrying out systematical analysis upon the forages and underlying soils, it appears the oligo-elements' composition is practically independent of the underlying agrologic horizon's composition.

The bovines had cobalt deficiency symptoms when grazing sandy savannah's pastures of low Ivory Coast, but we don't dispose of analysis concerning these pasture-lands.

It has to be noted in the following results that the most interesting pasture of the sahelic zone, with Aristida mutabilis, presents a minimum composition for copper and manganese. Nevertheless the cattle doesn't show up deficiency signs as the moving of flocks is common in those regions.

(Table 1)

LITERATURE

G. BOUDET & F. BAYENS - Une méthode d'étude et de cartographie des pâturages tropicaux (Investigation and cartographic method for tropical pastures), Rev. Elev.Med.vét.pays trop. 1963 : 191-219

(Table 1)

SAHELIC ZONE ANALYSIS

SAMPLES	Mn in part by million of dry substance	Cu in part by million of dry substance	Co in part by million of dry substance	Mo in part by million of dry substance
Aristida mutabilis : on fine sand :	6 18	4 0.07	0.2 0.3	0.04 0.009
Brachiaria ramosa : on fine humiferous sand :	36 27	5 0.1	0.4 0.4	0.18 0.033
Schoenefeldia gracilis + Aristida funiculata : on fino clayey sand :	29 42	18 0.15	0.3 0.2	0.07 0.004
Panicum turgidum : on coarse, impoverished sand:	24 17	8 0.08	0.4 0.2	0.08 0.012

SUMMARY

A method of study and mapping tropical pastures

The technique which we have put forward consists of :

1) A detailed classification of the vegetation. This is done by phytosociological surveys of minimal areas situated in different vegetation groups. The comparison of these surveys shows a serie of various types of pastures characterized by their floral components and ecological conditions specific to them.

2) The floral components of each type of pasture are obtained from a grid survey of a few examples of each characteristic group. A statistical survey of these results enables us to assess with greater exactitude the species frequency and the basic cover if the perennial species are abundant.

3) The forage value of each type of pasture is determined by random sampling ; aliquot samples are made for the determination of the nutritional value of the pastures and their trace-element content by periodical cutting of 25 m2 of ungrazed land to evaluate the exact yield of the pasture allowing for optimum fallow intervals.

4) The survey is completed by constructing a map based upon aerial photographs.

RESUMEN

Metodo de estudio y de cartografia de los pastos tropicales

Los autores presentan un metodo de trabajo que comprende en primer lugar, un inventario detallado de la vegetacion, que se efectua por levantamientos fitosociologicos de zona minimas repartidas en distintos individuos de agrupaciones vegetales. La comparacion de los levantamientos da lugar a una serie de tipos de pastos caracterizados por su composicion floristica y las condiciones ecologicas de sus estaciones especificas.

El valor forrajero de cada tipo de pastos queda precisado por siegas metodicas efectuadas sin preferencia. Estas siegas son efectuadas periodicamente, respetandose los tiempos de reposo optimos y las partes de plantas inapetibles quedando eliminadas de las pesadas por medio de la evaluacion del rendimiento.

Se efectuan muestreos alicuotos con objeto de apreciar el valor bromatologico de los pastos y su composicion en oligoelementos.

La cartografia de los pastos, relalizada por medio de la fotointerpretacion de las vistas aereas, finaliza los trabajos.