

# COQUIA: AN OPTION FOR FORAGE PRODUCTION

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## ABSTRACT

The objective of this study was to show the potential of Coquia (*Kochia scoparia* L. Schrad var. esmeralda) as a good option for forage production in arid and semiarid zones of Mexico. This plant is drought resistant and it grows well in eroded soils. It can be a good complement in the ration of different animal species (bovines, ovines, caprines, rabbits and equines).

## KEYWORDS

Coquia, fodder crop, animal nutrition, agronomic aspects

## INTRODUCTION

This plant represents an option in order to reduce death losses of livestock for lack of forage; it grows well in arid and semiarid lands, it could also adapt in subhumid zones and produce forage in the dry time of the year (Erickson, 1947; Durham and Durham, 1979; Foster, 1980; Anaya 1993).

Coquia (*Kochia scoparia* L. Schrad) of the Chenopodiaceae family, originated in the saline depression of Barabanskaya, near Novossibirsk in the Central-Sough region of Asia and was introduced to America at the beginning of this century. In Mexico, it has been used for more than 25 years (Anaya, 1989).

Coquia is a low-cost annual plant, with high protein content, drought resistance and adaptation to a great variety of soils including saline and eroded soils (Anaya, 1992).

During drought periods, livestock loss caused by a shortage of forage can be a severe problem worldwide. To reduce these losses, new fodder plant options must be examined, particularly in Mexico, where the shortage of forage is becoming worse on many states.

## ADAPTATION OF COQUIA

Kochia has a great adaptability; it is located in the five continents. The area dedicated to this species is unknown, however, its use is growing.

## AGRONOMIC ASPECTS

The seeding method is the same as for alfalfa; in uneven lands it could be sowed to the volle. It is recommended, not to cover the seed with more than 3mm of soil with a seed density of 4 to 8 kg/ha. Soils should be naturally fertile, there is, preference for organic matter or fertilized with 60 kg/ha of nitrogen and 40 kg/ha of phosphate (Coxworth and Kernan, 1988; Coxworth *et al* 1988).

The seeding date of Coquia is January through May under irrigation conditions. Under rainfed regime for arid and semiarid zones, it should be sown at the beginning of the rains and in humid and subhumid zones with the last rains (Hoechst, 1992; Osuna, 1985; Anaya, 1993).

Coquia may be sown with other forages such as oats, salty grass and barley, in a mixed stand.

The stand should be cut at 5% flower, the period when the plant reaches its highest protein content, which ranges from 16 to 28% (Finley y Sherrod, 1971; Farias, 1985; Hernández, 1986; Anaya, 1989; Reyna, 1994).

It is important to cut the crop 15 cm from the soil surface in order to facilitate branching.

## WATER CONSUMPTION AND YIELD

Coquia is also distinguished for its low consumption of water. It requires 4 or 5 times less than when alfalfa needs since rainfall of only 200 mm can produce 40 to 60 tons of green forage per hectares. When irrigated with 50 - 60 cm of water, the production could reach

80 to 130 tons per hectare of gree matter (Table 1). Coquia can be effective in reducing quifer overexploitation.

## ADVANTAGES

Some advantages of Coquia are the following:

- Wide adaptation to climates and soils;
- Tolerant to salinity;
- It grows in eroded soils;
- Resistant to drought, once established in good soil conditions;
- Germinates at low temperatures;
- Resistant to plagues and diseases;
- Plant of high palatability, good digestibility and low in fiber;
- From quick growth, it could produce up to 300 hg/ha/day of dry matter;
- The forage could be conserved in form of silage, hay and pellets;
- Forage of high quality, comparable with alfalfa;
- Economic;
- High relationship benefits/cost.

This plant grows from sea level to 3,600 meters above sea level, pH from 5 up to 12; it tolerates low temperatures upon germinating.

## HANDLING

Since Coquia is a vigorous plant, it requires minimal care. However it may be necessary to use protective fencing to evaluate the benefit of the plant in enhancing recovery of rangeland.

Weeds should be removed to reduce competition.

Coquia is a versatile forage, since the livestock could graze it directly, or it may be used for silage, hay and pellets. It requires minimum care and the cost of cultivation is low, since seeding rate is low at 4-8 kg a hectare. Also, one could sow it in a bland with oats, and other fodder plants.

Its high protein content is an asset in the diet and average daily gain may be 200 - 300 grams in sheep and 800 to 1,200 grams in cattle.

When Coquia is provided as 35% of the total animal diet, the consumption of water increases 25% overall when the forage comes from saline soils.

This plant is recommended up to 35% total of the diet of ruminants: livestock for meat, livestock for milk, goats and lambs; and up to 50% in equines, pigs, chicken and rabbits. It is also used as a salad for human consumption (Sherrod, 1971; Sherrod, 1973; Rodriguez, 1988; Santana, 1991; Anaya, 1996).

## SOCIO-ECONOMICAL AND ECOLOGICAL POTENTIAL

From the social and economic point of view, Coquia represents an option for the production of forage since it grows well in arid, semiarid and subhumid zones.

This plant represents a high socio-economical potential for the communities dedicated to cattle production where rainfed systems of production prevail. In areas under irrigation it is a good alternative in order to reduce the depression of the aquifer levels. With 20 tons of green forage per hectare, a benefits: cost ratio of 1.5 is obtained, which lowers considerably the costs of production in the animal production activities. Also, one could use it as a source of protein in balanced foods. Given its high potential of production, it fixed CO<sub>2</sub> and improves the environment.

In Mexico, more and more institutions of teaching, research and technological development as well as official dependencies, state governments and non-government organizations carry out research and demonstrations of this excellent plant, because of the support for its use and handling by several types of agricultural producers.

At the moment, in Mexico, seed is available for diverse ecological conditions.

With all these qualities and advantages that Coquia offers, this forage is becoming not an alternative, but a real forage production option.

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**Table 1**  
Coquia yields in different regions of Mexico. \*

REGIONS	YIELD OF GREEN MATTER 1ST. CUTTING, TON/HA	CRUDE PROTEIN %
<b>Arid and semiarid zones</b>		
Tecamaco, México	30 - 40	17 - 21
Metzquititlan, Nopala, Alfajayucan, Huichapan, Chapantongo y Tecozautla, Hidalgo	25 - 120	16 - 28
León, Guanajuato	40 - 60	17 - 21
Perote, Veracruz	20 - 30	16 - 18
Zaragoza, Coahuila	15 - 20	16 - 18
Chapingo, Méx. (Hard pans)	20 - 30	16 - 19
Temamatla, México	40 - 70	18 - 24
Montecillo, México	70 - 130	18 - 28
<b>Saline soils</b>		
Comarca Lagunera	40 - 70	18 - 22
Laguna de Sayula, Jalisco	50 - 70	17 - 21
Ex-lago de Texcoco. Méx.	35 - 65	16 - 20
Costa Hermosillo, Sonora	35 - 60	19 - 23
Cuitzeo, Michoacán	20 - 30	17 - 20
Mixquic, México	35 - 100	18 - 26
México, D.F. (abandoned urban areas)	40 - 90	19 - 22
* Different Sources of Information		