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**CONSTRAINTS AND OPPORTUNITIES FOR DEVELOPMENT OF GRASSLANDS
IN URBAN AREAS OF THE NIAYES ZONE IN SENEGAL**

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Abstract

A survey was carried out in urban areas of the Niayes zone in Senegal to explore grasslands development in agropastoral systems around towns. Rapid rural appraisal and farms multiple visits were done to describe the forage cropping system, identify constraints and opportunities of developing grasslands in urban areas. In Niayes urban areas, forage production system is being developed based on the cropping of several grass and tree species. Only a minority of farmers is involved in that activity. Level of grass production is rather low. Weak development of grasslands is observed. Main reasons are: farmer poor willingness to crop for livestock feeding, lack of water and production factors including seeds and fertiliser, land tenure system and lack of integration between livestock and horticulture, security and economical environment. There are opportunities that need to be developed for improvement of grassland production in the Niayes as water reserves could tolerate more forage cropping. Research and development programs should focus on programs that could generate recommendations on grasslands development in association with horticulture which is a major activity in Niayes areas.

Keywords: Grasslands, Constraints, urban agriculture, Senegal

Introduction

The Niayes zone, located in the Senegalese west coast is characterised by a multipurpose agricultural system dominated by horticulture and livestock. Intensive cattle fattening and Dairy farms could contribute more to alleviate feeds resources shortage that limits livestock productivity. Main feed resources involve crop residues such as cereal straws and horticulture by-product. Cereal and legume processing factories generate industrial by-products that can be used for ruminant feeding. However a great part of those by-product is exported. Therefore, a strong feed resources deficiency limits livestock productivity in urban areas. Forage cropping could contribute to improve nutrition status of ruminant raised in the Niayes zones.

Grasslands have been introduced in the Niayes areas at the beginning of the eighties. Some grasses have been introduced under irrigation by the ISRA research team. Introduction of grasses in high producing dairy cows feeding system was successful (Fall et al., 1991). Conservation methods including silage and hay making was tested and adopted in industrial dairy farms (Fall et al., 1996) while adoption of the technology of forage cropping was low in small scale dairy farms.

A survey was conducted to evaluate development of grasslands in Niayes zone and identify constraints and opportunity that influence its development.

Materials and Methods

The study was carried out in the Niayes zone located in the western border of Senegal facing the Atlantic ocean from Dakar to Saint Louis. To explore grasslands development in urban agriculture, seventy farms were visited several times. Combination of rapid and slow methods was applied including farmers interviews and site visits. Multidisciplinary team including forage agronomist, animal scientist and economist was involved in that study.

Questionnaire included farm size and production, current state of livestock and horticultural activities, existence of forage cropping, introduced species, performances and constraints. Farmers gave their contribution to evaluate the perspective for the future of that activity in a system oriented on separate development of livestock and horticulture.

Results and Discussions

Forage cropping status in the Niayes zones production systems was evaluated. In the exploited areas in the Niayes, forage cropping is present in a small part in space occupation. There are a few farms exploiting grasslands. Planted area were of 20 to 100 hectares per farm.

Only 6% of the visited farms have introduced grasslands in their production system.

Production performances are low and forage cropping system is not modern with for example appropriate production plans and forage management and good methods of conservation

Tree species are very usefull in ruminant feeding system in urban farming. Variable species have been introduced during the early eighties in periurban areas. Around towns, tree forage cropping system includes *Leucaena leucocephala*, *Prosopis chilensis*, *Mucuna sp*, *Glyricidia sepium*. As live fence *Casuarina equisetifolia*, *Azadirachta indica*, *Prosopis chilensis*, *Eucalyptus spp*, *Pitcellobium dulce* and *Samanea saman* are well represented in the urban lanscape.

Selected grass species of short cycle and a high growth potential where introduced in irrigated periurban areas of Niayes zone in association with horticulture. Introduced grass species include differents cultivars of *Panicum maximum*, *Pennisetum purpureum*, *Bracharia mutica*, *Sorghum vulgare*, *Zea mais.*, *Andropogon gayanus* and *Dactyloctenium aegyptium*.

Forage productivity is not measured in 97% of visited farms. Produced biomass is not properly managed as no information about yield and forage productivity are available.

Research trials conducted in ISRA research station allowed up to 21 tons of different grass species per hectare in Sangalcam the ISRA station located in the Niayes zones (Richard, 1987). Those performances were recorded under daily irrigation of 4 to 5 mm of water. Fertilisers were used up to 65 kg N, 35 kg P₂O₅, 50kg K₂O per hectare (Richard, 1987)

Forage quality is variable according to species, location and harvesting period. But generally speaking, forage quality is good averaging 87, 11.5, 69, 39 % DM for organic matter, crude protein, cell wall and ligno-cellulose respectively. Net energy concentration goes from 0.5 to 0.7 forage unit (Rivière, 1978; Richard, 1987).

Production costs are not evaluated due to lack of information in produced biomass. Local environment characterised by soil quality and water availability plays a major role in production cost variability. Taking into account socio-economics could help evaluate production costs. More research effort needs to be concentrated in forage cropping economics in the future.

Hay making is the major forage conservation method in small scale dairy farm in the Niayes zone. A few industrial big dairy farms are making silage for better conservation of fresh forage and to meet nutrients demand of raised high producing dairy cows. That technology requires high investment and technology that are not available in small scale farms.

Forage production systems is of low input and productivity. Modern techniques for forage production are not well used among producers although efforts have been made to adapt good forage species that can be well developed in periurban areas of the Niayes zone.

There are opportunities for developing grasslands besides horticulture in urban areas.

Livestock intensification is a major orientation defined by politics to improve food security in cities. Those choices can be supported by water availability and ecosystems characteristics that offer possibilities of cropping several grass and tree species.

Various constraints explain the weakness of grasslands in periurban areas of the Niayes zones.

In fact forage cropping is not among the first choices of farmers in land allocation. Livestock is not well integrated in the horticultural system.

Grassland development would require high investment that cannot be supported by small scale farms which represent 99 % of the producers (Fall et al., 1999). Livestock is, in majority, a low investment system that actually limits its expansion.

Security is among the serious constraints for forage cropping development. Farm protection is not efficient and theft cases are common.

Land tenure system in the Niayes is one of the main drawbacks that do not stimulate grasslands development in urban zone. There is a hard competition between urbanisation and agriculture. Open pastures regression is observed and horticulture is the major activity that is developed by populations. Therefore priority is given to horticulture which does not allow large development of forage cropping in those space constrained areas.

Other constraints involve poor access to new technologies and production factors that calls for assistance from research and extension services and also development that need a modification of investments allocation rather low for livestock during past 20 years (Christensen, 1997).

High agricultural productions are expected from cities whose contribution in food security should be of major importance in coming years. Political orientations, suggesting livestock development system based on milk and meat intensive production cannot be met without sustainable solution of ruminant feeding systems. Therefore grasslands appears to be an alternative to be considered for production of good quality forage to satisfy dairy industry demands.

Identified constraints could be limited by integrated systems that associate livestock and agriculture. Those practices are used but livestock gives more to horticulture in term of organic matter recycling and animal traction. The feed back could help integrate forage cropping in the horticultural system. However, space allocation taking into account both activities may be difficult in expanding cities. Multipurpose browse legumes that play two roles like live fence and wind break and, in the other hand, as animal feed seem to be more appropriate in space constrained areas.

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