

Typification of the production system of snuff (*Nicotiana tabacum*) in the Guanenta province, Santander department, Colombia

Tipificación de un sistema de producción de tabaco (*Nicotiana tabacum*) en la provincia de Guanentá, departamento de Santander, Colombia

Jennifer Jiménez C.¹, Yesid Aranda C.², and Enrique Darghan³

ABSTRACT

In the province of Guanenta (Santander), lack of technical assistance received by producers is one of the main obstacles to the production of snuff. The objective of this research was to characterize the snuff production systems in the province, considering technical, socioeconomic and environmental variables. The sample was determined from census by producers supplied by COLTABACO, using stratified random sampling; the data were processed by multiple correspondence analysis. The results are shown as discriminant variables: type of snuff, the percentage of sharecropping, type of leaf curing, implementation of irrigation system, development of alternative crops, crops rotation and membership of producers to associations. Four types of production systems were found: i) conventional - snuff type burley, ii) technified - snuff type burley, iii) conventional alternative - snuff type burley, iv) conventional - snuff type black. Finally and aiming improve the production of snuff, this study propose improvement actions for technical assistance programs received by producers, alternatives for access improvement and availability of water.

Key words: technification, sharecropping, contract agriculture, multivariate analysis.

RESUMEN

En la provincia Guanentá (Santander), la asistencia técnica productiva es uno de los principales obstáculos para la producción de tabaco. El objetivo de esta investigación fue caracterizar los sistemas de producción de tabaco en la provincia, se indagó acerca de variables técnicas, socioeconómicas y ambientales. La muestra se determinó a partir del censo de los productores suministrados por COLTABACO, por medio de muestreo aleatorio estratificado; los datos se procesaron mediante análisis de correspondencias múltiples. Los resultados muestran como variables discriminantes: tipo de tabaco, el porcentaje de aparcería, tipo de curación, implementación de sistema de riego, desarrollo de cultivos alternativos y la rotación, y la pertenencia de productores a asociaciones gremiales. Se encontraron cuatro tipos de sistemas de producción: i) convencional - Tipo de tabaco burley, ii) tecnificado - Tipo de tabaco burley, iii) alternativa convencional - Tipo de tabaco burley, iv) convencional - Tipo de tabaco negro. Para mejorar la producción de tabaco se proponen acciones de mejora a los programas de asistencia técnica que reciben los productores, y mejorar el acceso y la disponibilidad de agua.

Palabras clave: tecnificación, aparcería, agricultura por contrato, análisis multivariado.

Introduction

The production of snuff (*Nicotiana tabacum*) stands out worldwide, because the profitability of snuff production turns out to be high, compared to other agricultural products (Peña and Rivera, 2011). Commercially, prices are stable to the producer, and depend mainly on the quality of snuff produced, the tobacco types are Virginia, Black, Burley and Oriental, the last two are the most marketed as this types are employed for cigarettes production (Castellanos and Montanez, 2006; Castellanos *et al.*, 2009).

By 2013 the country with the highest production of snuff was China (29%), followed by India (9%), Brazil (8%) and

USA (3%) (FAOSTAT, 2016). The European Union stands as the largest importer of crude snuff, followed by Russia, the United States and Japan (Traub, 2009).

According to official statistics, for 2014 in Colombia the blond snuff harvested area reached 6.336 ha with a production of 11.757 t, registering an increase of 56% and 50.2% in planted area and crop production respectively, compared to 2013 in which were harvested 4,061 ha with a production of 7,825 t (Agronet, 2016). Despite the increase, area and production of snuff in Colombia does not reach the levels presented for this product in 2005 when 10,892 ha produced 20,925 t of tobacco.

Received for publication: 04 October, 2016. Accepted for publication: 20 July, 2017

Doi: 10.15446/agron.colomb.v35n2.63972

¹ Faculty of Agricultural Sciences, Universidad Nacional de Colombia. Bogota (Colombia).

² Department of Rural Development, Faculty of Agricultural Sciences, Universidad Nacional de Colombia. Bogota (Colombia). yvarandac@unal.edu.co

³ Department of Agronomy, Faculty of Agricultural Sciences, Universidad Nacional de Colombia. Bogota (Colombia).



Between the 2005 - 2015 period the decline in harvested area is explained by the problems of performance and quality of the regions where domestic production tobacco is located, Nowadays farmers are replacing snuff production areas by other crops. The tobacco production in the country is concentrated in the departments of Santander, Norte de Santander, Huila, Guajira, Boyacá, Cauca, Valle, Tolima, Cesar and Quindio (Castellanos *et al.*, 2009).

In recent years the snuff production in Colombia has reached 1.3% in the agricultural GDP and 0.53% of manufacturing GDP. In the first quarter of 2016 the performance of the national agricultural industry shows an increase of 0.7% over the same period of 2015, particularly unprocessed snuff increased its production by 40.7% (DANE, 2016). The national tobacco industry has been highlighted in the national economy by creating jobs (CNCPT, 2010), it is estimated that the sector generated 17,000 jobs in the production phase and 8,000 jobs in the industrial phase; it is also an important source for income generation for the departments through taxes and foreign exchange, generated by exports of raw and processed snuff products (Agrocadenas, 2005).

Regarding the sector competitiveness, the trade balance for 2014 reports that imports of snuff and its derivative products amounted USD \$66'340 million, while exports reached USD \$54'155 million, showing a negative balance of 19%; usual trend since 2012 (SIEX, 2016). This reflects a loss of competitiveness of the tobacco industry regarding its performance in the past decade, since the 2002-2009 period showed a positive balance for the country.

Santander department is located in the Andean region of Colombia, Locally the snuff production is considered one of

the most important economic lines in agriculture (Mojica and Paredes, 2005); its production is concentrated in 35 municipalities. By 2014 about 5,400 ha were cultivated, representing 56% of the national area, reaching a production amount of about 7,555 t of snuff leaf (Fig. 1), with average yields of 1.68 t ha⁻¹ (MADR, 2015) and an average acreage per farmer of 1.7 ha. In Santander farmers cultivate two types of snuff mainly: blond type tobacco and black type, performing 56.7 and 43.2%, respectively. Farmers produce mainly burley snuff in the first half of the year, because the high environmental availability of water and higher purchase prices versus the black type snuff, but black type snuff is considered complementary, because the tobacco production is a tradition in some municipalities of the department. Among the benefits some of the major difficulties facing the production of snuff in the department are the training for technical improvement of the system and high production costs (Gobernación de Santander, 2010).

In the province of Guanenta (municipalities of San Gil, Aratocha, Barichara, Jordan, Curiti and Villanueva), the production of snuff is mainly related to rural economy systems with an average of 2.5 ha per production unit (Castellanos *et al.*, 2009), production is related to smallholdings, intensive family labor and sharecropping arrangements, where the owner offers the land and, as return, receives a percentage of gross production (Quintero, 2001). In the province the major constraints facing the producer of snuff are related, among others, to the low adoption of technologies by some farmers, land not suitable for cultivation, limited access to irrigation water, low use of inputs. This condition itself generate low yields and low product quality (Mojica and Paredes, 2005). The production of snuff is performed by contracted farming systems, with the presence of two companies i) COLTABACO and ii) British American Tobacco;

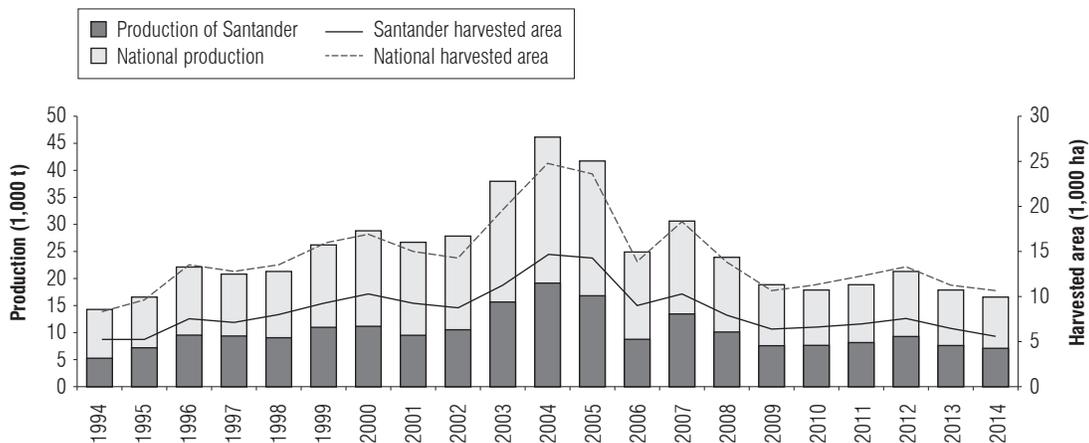


FIGURE 1. Harvested area and tobacco production, national and participation of the department of Santander. Source: The authors, based on Agronet (2016).

who established agreements of purchase depending specific qualities and quantities, with agreed prices; in turn, these companies provide services back to the farmer as the provision of agricultural inputs and technical assistance (Eaton and Shepherd, 2002).

The objective of this research was to typify the snuff production system in the Province Guanenta, Santander, to generate information and propose actions aimed to improving the competitiveness of this production system located in the national territory.

Materials and methods

The Guanenta province is located south east of the department of Santander (Fig. 1) in the Eastern Cordillera of Andeans (Colombia). Total length is approximately 3,800 km² and its formed by 18 municipalities, among which Villanueva, San Gil, Curiti, Barichara, Aratoca and Jordan are municipalities with more snuff cultivated area. According to producer's census by COLTABACO, in the province are 985 farmers that signed purchase agreement of snuff blond production and / or snuff black with this company in 2015. the census was made following an stratified proportional random sampling (Schaeffer *et al.*, 2006), taking as strata the municipalities where the company had purchase agreements, The sample size was determined by formulates $n = (Np(1-p)) / ([[(N-1) (\epsilon / z)^2] + p(1-p)])$, where N is the number of producers who signed purchase agreement with the company in 2015 (985 Producers); z (score of the normal distribution) is the level of confidence (95%); ϵ is the sampling error (4.7%); p is the proportion of producers located in the province and with signed purchase agreements with the company (0.9) and $q=1-p$. The sample size estimated was 92 Producers (n). The methodology to estimate the proportional weight of each stratum (municipality) n_i was obtained with $w_i = N_i / N$, where w_i corresponds to the weight of stratum i; N_i correspond to the number of snuff producers located in stratum i (municipality) and N is the number of producers who signed purchase agreement in each municipality 2015. The numbers of surveys to implement each layer are in table 1.

It was built an analytical model with 98 variables related to four criteria (general, technical, socioeconomic and environmental), a questionnaire was developed, it validated with 12 producers. Later, between February and April 2016 the questionnaire survey to the producers according stratified sampling was applied.

TABLE 1. Sample size with proportional affixing.

Stratum	Municipality			
1	San Gil	85	0.09	8
2	Jordan	22	0.02	2
3	Villanueva	372	0.38	35
4	Curiti	272	0.27	26
5	Barichara	234	0.24	22
Total		985	1	92

The variables were predominantly quantitative and continuous; some of them are discrete, it was necessary to reclassify using the optimal method of the accumulated frequency root (Schaeffer *et al.*, 2006). 24 variables were constants and 14 variables complementary. Multiple correspondence analysis (MCA) was applied incorporating only the discriminant variables for the population (60 variables), distributed as follows: i) General: related to the site where production takes place, possession of it and information of respondents (3 variables); ii) Technical: related to the production process of snuff, other crops and livestock production (39 variables); iii) Socioeconomic: related to the financing of production, the products destination, the amount and type of labor required for production, quality of life, and the farmer household (15 variables); and iv) Environmental: related to climatic factors affecting production, the use of environmental resources, availability and access to water and climate change (3 variables).

Multiple correspondence analysis (MCA) was used as technique to detect the common information between variables by new variables, which are called factors (Jolliffe, 1986). A matrix of individuals containing qualitative or nominal variables was achieved to categorize the population, synthesizing information and obtaining individuals similar in function on the association between categories of respondent's variables. The variables formed a Burt matrix containing all possible crosses between the surveyed variables (Greenacre, 2007), and through Chi-square statistical was established interdependence by the cumulative frequency, which explains the percentage of variability in dimensions.

The multivariate analysis technique allowed establish, in first place, the relationship between the variables of each criterion with an individual way (general, technical, socioeconomic and environmental); and secondly, the relationship between all the criteria and variables according to the proposed analytical model, determining the variables used to establish the production systems of snuff in the territory.

Data processing was performed using free software (R studio), obtaining plots in two dimensions that explain the greater variability of the components, which were used for the discussion of results.

Results and discussion

General characteristics of the tobacco production system in the province of Guanenta

Variables that became constant (with variance equal to zero) when collecting data were: crop association, implementation of seedbed, weed control, leaves classification, record of activities, technical assistance, production financing, washing water, kitchen area, working baths, and electric power.

The production system in the territory is characterized by:

- i) *Technical component*: tobacco producers do not practice associate farming models in the tobacco crop, they rely on technical qualified assistance, use seedbed in trays, manage weeds control, classify leaves during packing and do not make any record of activities or costs of production.
- ii) *Socio-economic component*: contracts of purchase and sale are the financing source of tobacco production, the producer establishes the number of plants or the area to sowing, the expected production, the financial credit, the supervision of the crop and technical consulting and prices of the leaf are related to the tobacco classification of every company in the zone. There are two leading industries in the country, COLTABACO and British American Tobacco, which produce primary tobacco, establishing contract farming agreements with producers and developing the activity of agribusiness of cigarettes (Castellanos, 2009). The product is mainly for sale, family members work in the farm, and eventually wages are paid. All properties surveyed have kitchen area, functional bathrooms and electric power.

Analysis by criteria

General criterion

According to general information variables, the variability of this component is explained by four dimensions with 65.9% (Fig. 2); in order of contribution: *municipalities* (24.4%) standing out Villanueva and Jordán; *Land tenure* (15.4%) for the development of productive activity, where both owners and sharecroppers are those who develop tobacco production (Agrocadenas, 2005). The third dimension is explained again by the variable municipality, in particular San Gil which contributes with 21.6%.

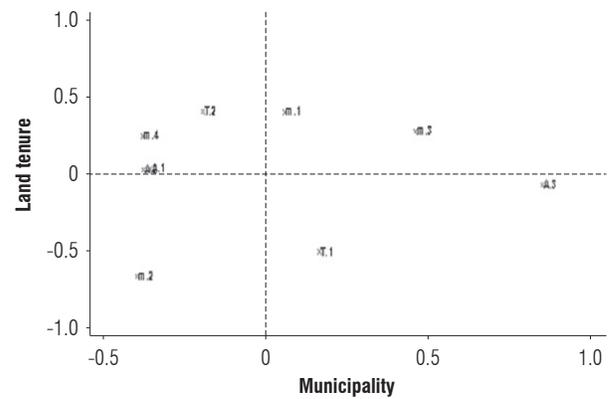


FIGURE 2. Correspondence map for the General criterion.

It is inferred that in Villanueva municipality there is a major trend to find lands with areas upper to 5 ha with predominance of proprietary farmers of the land. In contrast with the municipalities of San Gil and Curití where predominate systems under sharecropping in lands with areas of less than 5 ha, where land owners prefer to distribute small areas to diverse sharecroppers in order to minimize the risk and to improve the conditions related to the development and benefit every sharecropper can add to the crop, improving its profitability.

Technical criterion

The technical component explains 64.2% of variability across 9 dimensions (Fig. 3). In the first dimension stands out for its importance, *rotating crops* (4.8%) and *planting* (3.3%); in the territory prevail small farm areas in order to take advantage of the productive land and consequently developing small areas of tobacco production. Nowadays, it is observed the phenomenon of parcels of farms mainly in the municipality of Barichara, generating the arrival of new owners, who acquire the land of build condominiums or rest homes. The second dimension explains the 9.4% of the variability and highlights the implementation of irrigation systems (5.2%), characteristic of technical productive systems that improve performance. The third dimension is explained by the *type of curing* (7%) due to the fact that some farmers have initiated the implementation of the curing system (hanging all the tobacco plant in a drying facility known as “caney”) that is more efficient in terms of the labor requirement, reducing it up to 30%, which improves the quality of the product. Currently, it is necessary to train the producers about benefits generated by this practice, since they perform their work inadequately lowering their massive implementation.

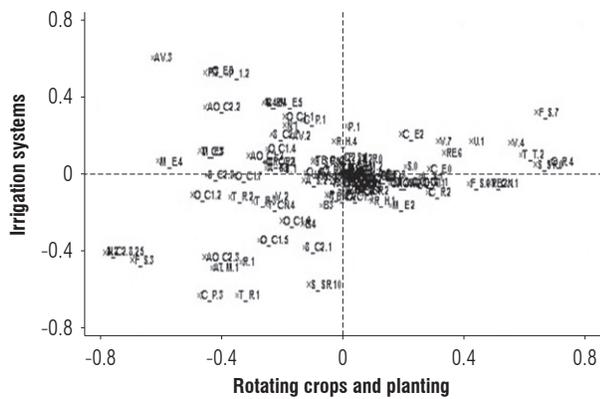


FIGURE 3. Correspondence map for the Technical criterion.

The territory is characterized by low-tech production systems; however, in the third quadrant are located productive systems that have implemented technical improvements for agricultural production.

Social and economic criterion

According to the analysis of socio-economic data; 60.2% of the variability is explained by four dimensions. In the first dimension, 18.7% of the variability correspond to the *wage earner* (13.9%). In the territory, it is not common to find this situation, due to the fact that production is related to family farming systems; In there, activities out of the farm are scarce, because labor force is used almost exclusively for own production. The second dimension is explained by *acordds with loans entities* (5.3%) because of the high presence of credit and financial cooperatives offering these services, It is important to add, the department of Santander is renown for having an honest economic and social management (Davila, 2004). The third dimension is explained by the *size of the family nucleus* (9.2%), which is fundamental for family farming systems where the development of agricultural activity derives from family members work force whose assume all farming tasks.

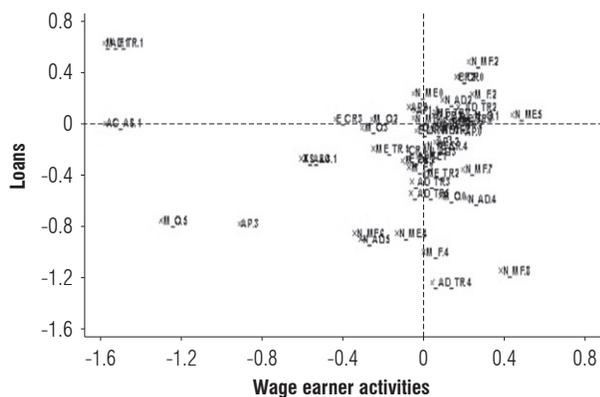


FIGURE 4. Correspondence map for the Socio-economic criterion.

In the correspondence chart (Fig. 4), the sample tends to be very homogeneous, in terms of the mentioned criteria; however, there is a close relationship between the people who exercise an activity as employees and sharecroppers who pay the sixth part to the owner of the land. However, the growth of San Gil in last years has created a greater demand of labor in the urban zone, which can be generating the connection to non-agricultural activities.

Environmental criterion

According to the environmental criteria, 68.9% of the variability is explained by three dimensions; the first dimension (Fig. 5) explains 38.1% of the variance and incorporates the *difficulty for water use*. The category does not present difficulty for water using (45.3%) and the variable environmental phenomenon in the category does not present environmental phenomena with the capacity to affect production (40.4%). Those are atypical data, due to the drought phenomenon faced in the second half of 2015. The second dimension accounts for 17.8% of the variability and highlights the variables of environmental phenomenon - *hail* (35.1%) and water source in its *broken* category (27.4%). It is important to rescue the environmental phenomenon of hail, which affects the municipalities of San Gil and Curití, and generates production loss and affects the quality of the leaves (Mojica and Paredes, 2005), becoming a social problem, currently harvest insurance ensures performance yet not quality of product, which is punished in the purchase price to the producer. The third dimension explains 13% of the variability with the variable difficulty for water use and its relation to *drought*.

In the environmental component, the climatic seasonality of the province stands out, with little rainfall during the year; there are prolonged water deficits, mainly in the phase

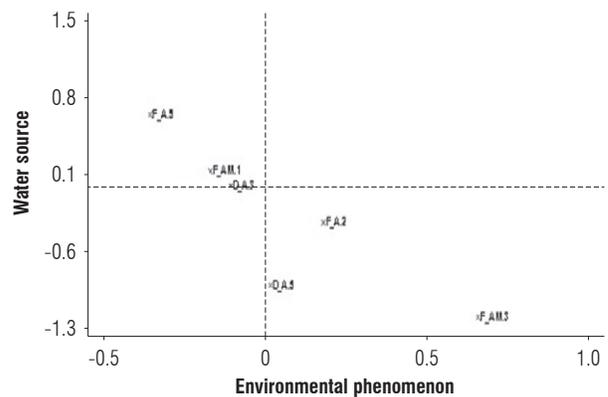


FIGURE 5. Correspondence map for the Environmental criterion.

of rapid growth of the vegetative period, which significantly affect production and quality (Ledesma, 2012).

Typification of tobacco production systems in the province of Guanenta

From the main component analysis incorporating all variables of the model, nine dimensions are identified that explain 60.6% of the variability (Tab. 2).

The first three dimensions explain 31.57% of the variance. The first dimension (12.8%) explains for the category of *activity as employee* (2.6%), followed by the *sharecropping* in which the owner obtains the sixth part of the production (2.6%), and in the third order the *production of black tobacco* (2.3%). The second dimension with 10.6%, group together the *type of irrigation by drip* (3%), *additional crop-tomato* (2.8%); the declaration of *farmer's membership* into the National Federation of Producers of Tobacco (FEDETABACO) (2.3%), and the *structure of storage* (2.2%). In the third dimension (8.2%) emphasize the *type of curing-hatchet* (8.6%) and *no external sales* (2.2%).

The first dimension is formed by socio-economic criteria emphasizing the *payment of the sixth part to the owner* and *executing activities as employee*. Also the variable *type of tobacco in its black* category becomes relevant due to the change of production towards blond tobacco (Burley) as consequence of a greater demand of blond cigarettes at tobacco companies (Mojica and Paredes, 2005). However, black tobacco production in the province is located in areas with higher temperatures, mainly in the low-lying areas of the municipalities of Barichara and Jordán, while in other municipalities of the province it is produced as complementary product to Burley type tobacco as a rotation crop during the second semester (Mojica and Paredes, 2005).

The second dimension is formed by the technical variables, where the use of *technology on crops* becomes relevant.

The productive system has a drip irrigation system, storage structures and area is used for other crops; Showing a greater degree of use of technology that allows the farmer to improve performance. At the socio-economic level the recognition of being part of *associations or guilds*, allows to identify farmers who are more immersed in the dynamics of the sector and committed to improve production, they belong to producers associations which are affiliated to FEDETABACO (Castellanos, 2009).

In the third dimension are relevant technical criteria, especially the variables of *curing-hatchet* and *additional sales* of tobacco, which are dependent on each other. Performing the cutting of the whole plant requires eliminating flower buds and applying inhibitors, and it is necessary to adapt or construct structures different from the traditional ones for the drying of tobacco leaves. Nowadays, this practice has a little use in the territory, mainly because of the practice of the producers to carry out traditional curing (leaf-to-leaf healing). They believe that high-quality butchering curing tobaccos is less heavy thus the production is lower, and also by the large percentage of sharecropping producers that are limited to construct this type of structures for profit.

Types of productive systems

According to the correspondence map (Fig. 6), four types of productive systems of tobacco in the province of Guanenta are identified.

Type 1. Conventional production system - Burley type tobacco

This type of production is used by about 67% of the province producers. These are conventional production systems that technically are producers of Burley-type tobacco, whose main rotation crop is bush bean. They make additional sales of tobacco leaf to external buyers, so the predominant type of curing is leaf-to-leaf type. Thirty seven percent

TABLE 2. Variability explained by dimensions for each evaluated criterion.

Dimension	Value singular	Inertia	Chi-Square	Percentage	Accumulated percentage	Histogram
1	0.1422	0.0202	6467.6744	12.7989	12.7989	****
2	0.1293	0.0167	5343.0991	10.5735	23.3724	****
3	0.1139	0.0130	4144.3055	8.2012	31.5736	***
4	0.0992	0.0099	3148.9104	6.2314	37.8050	**
5	0.0948	0.0090	2873.0020	5.6854	43.4904	**
6	0.0895	0.0080	2558.6953	5.0634	48.5539	**
7	0.0843	0.0071	2271.3055	4.4947	53.0486	**
8	0.0781	0.0061	1949.2689	3.8574	56.9060	**
9	0.0763	0.0058	1860.5165	3.6818	60.5878	**
10	0.0736	0.0054	1731.4459	3.4264	64.0141	**

labors, and have kitchen area, working bathrooms, electric power and water for washing.

The main relevant variables to characterize the tobacco production system are: tobacco type, percentage of sharecropping, activity as wage earner, type of curing, alternative crops, rotation and association of the farmer with guilds.

The methodology used, allowed us to establish four types of production systems: i) Conventional production system - Burley type tobacco, ii) Technified production system - Burley type tobacco, iii) Conventional production system - Black type tobacco, iv) Conventional production system - Burley type tobacco, alternate.

Currently an issue is the pressure exerted by transformation of the rural environment given the proximities with urban area, related by the multifunctionality of agricultural activities, which generate the displacement of agricultural activity and the decrease of labor for the agricultural sector due to the requirement of labor in other economic sectors of the region.

The lack of support from the governmental and municipal entities is recognized as an important problem at social level in the region, in essence, the process of coaching and technical assistance to the different crops in the province are developed by private companies. An outreach process is required with a greater participation of public entities in order to support the efforts of private companies and thus seek to solve production problems in the province of Guanenta. Also, it is necessary the commitment of these entities to establish technical committees that tackle the real needs of the rural population.

Outreach processes in the Guanenta province should be focused on improving tobacco production conditions in the area, based on programs designed to improve access to water and implement efficient production techniques, improving not only performance but also the quality of tobacco.

Future research that could be developed to contribute to the improvement of the competitiveness of the system of snuff in Guanenta province corresponds to characterize with greater level of detail the groups included in this research, specially the analysis of production systems with being sharecroppers in the territory, to evaluate the effects by the change of land uses, multifunctionality of agricultural activities and the different logics of production and the profits for the different agents involved in the production system of snuff

Literature cited

- Agrocadenas. 2005. La cadena del tabaco en Colombia. IICA, Bogotá, Colombia.
- Barrientos, J.C., G. Plaza, and J. Rojas. 2012. Comparative analysis of Flue-cured tobacco production costs in Santander and Huila (Colombia). *Agron. Colomb.* 30(2), 289-296.
- Castellanos, O., L. Torres and D. Rodríguez. 2009. Desarrollo tecnológico e innovación de la cadena productiva del tabaco. Universidad Nacional de Colombia, Bogotá, Colombia.
- CNCPT - Consejo Nacional de la Cadena Productiva del Tabaco. 2010. Acuerdo de competitividad cadena productiva del tabaco. Consejo Nacional de la Cadena Productiva del Tabaco. Retrieved from: http://sioc.minagricultura.gov.co/templates/sioc_cadenas/docs/1109.pdf; consulted: October, 2016.
- Dávila, R. 2004. Innovación y éxito en la gerencia cooperativa, casos exitosos de cooperativas rurales de ahorro y crédito. Pontificia Universidad Javeriana, Bogotá, Colombia.
- DANE - Departamento Administrativo Nacional de Estadística. 2016. Boletín técnico: Cuentas Trimestrales – Colombia Producto Interno Bruto (PIB) Primer Trimestre de 2016. Retrieved from: https://www.dane.gov.co/files/investigaciones/boletines/pib/bol_PIB_Itrim16_oferta_demanda.pdf; consulted: October, 2016.
- Eaton, C. and A. Shepherd. 2002. Agricultura por contrato alianzas para el crecimiento. FAO. Retrieved from: <http://www.fao.org/docrep/004/y0937s/y0937s00.htm#toc>; consulted: October, 2016.
- FAO. 2016. Estadística de producción de tabaco FAOSTAT. Retrieved from: http://faostat3.fao.org/download/Q/*E; consulted: October, 2016.
- Forero, J., L.J. Garay, F. Barberi, C. Ramírez, D.M. Suárez, and R. Gómez. 2013. La eficiencia económica de los grandes, medianos, y pequeños productores agrícolas colombianos. pp. 69-111. In: Garay, L.J. (ed.). Reflexiones sobre la ruralidad y el territorio en Colombia. Problemáticas y retos actuales. OXFAM, Bogotá, Colombia.
- Gobernación de Santander. 2010. Plan prospectivo provincia de Guanenta. Gobernación de Santander and Fundación Universitaria de San Gil - UNISANGIL, San Gil, Colombia.
- Greenacre, M. 2007. Correspondence analysis in practice. Chapman and Hall and CRC Press, Boca Raton, FL, USA. Doi: 10.1201/9781420011234
- Grupo de Investigación y Desarrollo BioGestión. 2006. Estudio prospectivo en la cadena productiva del tabaco colombiana. Universidad Nacional de Colombia, Bogotá, Colombia.
- Jolliffe, I.T. 1986. Principal component analysis. Springer Series in Statistics, Springer-Verlag, New York, USA.
- MADR - Ministerio de Agricultura y Desarrollo Rural. 2015. Bullets cadena del tabaco- marzo-2015. Ministerio de Agricultura y Desarrollo Rural. Retrieved from: <http://sioc.minagricultura.gov.co/index.php/opc-documentoscadena?ide=19>; consulted: January, 2016.
- Ministerio de Hacienda y Crédito Público. 2015b. Resultados PIB cuarto trimestre 2014. Ministerio de Hacienda y Crédito

- Público. Retrieved from: <http://www.minhacienda.gov.co/portal/page/portal/HomeMinhacienda/saladeprensa/Presentaciones/2015/2015-03-17-PIB-IV-2014-oferta-3.1.pdf>; consulted: January, 2016.
- Mojica, A. and J. Paredes. 2005. Características del cultivo de tabaco en Santander. Centro Regional de Estudios Económicos de Bucaramanga. Retrieved from: http://www.banrep.gov.co/documentos/publicaciones/regional/ESER/bucaramanga/2005_diciembre.pdf; consulted: January, 2016.
- Peña, L. and H. Rivera. 2011. Análisis estratégico del sector tabacalero en Colombia 2005-2010. Universidad del Rosario, Bogotá, Colombia.
- Quintero L. 2004. Costos de producción de tabaco en Colombia. Documento de trabajo No 43. Observatorio de Agrocadenas IICA, Ministerio de Agricultura y Desarrollo Rural, Bogotá, Colombia.
- Renting, H., H. Oostindie, C. Laurent, G. Brunori, D. Barjolle, A. Jervell, and M. Heinonen. 2008. Multifunctionality of agricultural activities, changing rural identities and new institutional arrangements. *Int. J. Agr. Res. Governance Ecol.* 7(4-5), 361-385. Doi: 10.1504/IJARGE.2008.020083
- Scheaffer, R.L., W. Mendenhall, and L. Ott. 2006. Elementos de muestreo. Paraninfo, Madrid, Spain.
- Sistema Estadístico de Comercio Exterior (SIEEX). 2016. Estadísticas de comercio exterior, DIAN. Retrieved from: <http://websiex.dian.gov.co/>; consulted: January, 2016.
- Sonnino, R. 2007. Embeddedness in action: Saffron and the making of the local in southern Tuscany. *Agric. Hum. Values* 24(1), 61-74. Doi: 10.1007/s10460-006-9036-y
- Traub, A. 2009. El tabaco en un mundo de contradicciones. Oficina de Estudios y Políticas Agrarias (ODEPA), Ministerio de Agricultura, Gobierno de Chile. Santiago de Chile, Chile.