INTERNATIONAL JOURNAL OF PLANT, ANIMAL AND ENVIRONMENTAL SCIENCES
IJPAES

Volume-3, Issue-4, Oct-Dec-2013
ISSN 2231-4490

www.ijpaes.com

Received: 27th July-2013 *Revised: 31st July-2013* *Accepted: 17th August-2013*

Research article

COMPARISON OF *NICOTIANA TABACUM* L CULTIVATION IN DIFFERENT AGRONOMIC, GEOGRAPHIC AND CLIMATIC CONDITIONS OF KASARAGOD DIST. OF KERALA, INDIA.

Mini.M, P, M.Beebi Razeena

Department of PG studies and research in Botany, Sir Syed College Taliparamba- 670142, Kannur-Kerala, India.

***corresponding author-E-mail:** miniharitham@gmail.com

ABSTRACT: *Nicotiana tabacum* L commonly called tobacco is an annual plant belongs to family solanaceae. In India two species of tobacco, *Nicotiana tabacum* and *Nicotiana rustica* are cultivated .Tobacco can grow in different types of soil and in various climates. Kasaragod dist is the only one dist of Kerala that produce *Nicotiana tabacum* L. Pullur Periya, Ajanoor and Pallikara panchayath are the main areas of tobacco cultivation of this Dist. Here *Nicotiana tabacum* L is cultivated in different agronomic and geographical conditions. UV Spectrophotometric analysis reveals that tobacco cultivated in kuniya region (225 ft MSL) of Pullur Periya panchayath have more nicotine content (0.598mg/g) due to the nutritive soil present in this region compared to the tobacco(nicotine content 0.466mg/g) cultivated in sea coast area (21 ft MSL) of Pallikara that belongs to Pallikara panchayath. Soil of kuniya region is black have more organic carbon (1.89 %) than soil of Pallikara region (0.1578%). Tobacco cultivation is an ecofriendly cultivation and use only biofertilizers. But today cultivars face problems such as lack of experienced expert workers, tourism of coastal area, influence of building developers, rise in the cost of manures etc. Today's agricultural report says the position of Kasaragod dist in tobacco cultivation is low than that of other regions. This endemic ecofriendly cultivation must be protected by the welfare of local farmers.

Keywords: *Nicotiana tabacum* L, Agronomy , Geography ,Nicotine concentration**,** Ecofriendly cultivation

INTRODUCTION

Nicotiana tabacum L commonly called tobacco is an annual plant which belongs to solanaceae or night shade family is an important narcotic yielding plant contain nicotine. Tobacco includes numerous species which are grown throughout the world. In India two species of tobacco cultivated .They are, *Nicotiana tabacum* and *Nicotiana rustica*. *Nicotiana tabacum* is the common tobacco produce pink flower used for the production of cigarettes, pipe tobacco etc. *Nicotiana rustica* produce yellow flower and is cultivated only in North East and is for the production of hookah and chewing. Alkaloid, organic acid content are differs due to the factors include species of the plant variety and strain, growing conditions particularly soil and climate and methods of culture and curing. The main source of tobacco is *Nicotiana.tabacum* L. Each variety of tobacco has different growing requirements and that help in the production of a healthy crop. Tobacco grows in many types of soil and in varying climates. Difference in soil and climate produce leaves that have specific characters and require different methods of fertilization, insect and decrease management, harvested curing. Clay loam soil properties changed due to tobacco waste applications in Turkey [1] .The functional diversity of soil microbial community in tobacco monoculture of Argentina changed due to the impact of *Trichoderma harzianum* biocontrol agent[4]. The soil water stress affected the different growth stage on quality and quantity trait of Virginia tobacco in Iran [8]. In kerala kasaragod dist is the main producer of tobacco. The present study was conducted to investigate the physico chemical properties of soil and concentration of nicotine of tobacco cultivated in different agronomic, climatic and geographical conditions of this dist.

MATERIALS AND METHODS

Study area. Kasaragod district lies on the North West boundary of Kerala between $11^0$48 N latitude and $74^0$52`E longitude. Pullur Periya, Ajanur and Pallikara Panchatyath of this dist where tobacco is cultivated. There are two area belongs to this study,

Pallikara region- located $12^0$22'39.34"N $75^0$02'46.59"E and belongs to Pallikara Panchayath nearest to Bekal fort, sea coast of Arabian sea. It have 21 ft MSL.

Kuniya region; located $12^0$25'13.54"N $75^0$04'56.05"E belongs to Pullur P eriya panchayath and it is the midland area have 225 ft MSL.

Field visit conducted in both vegetation phase(Aug 2012) and processing season (2013 march) and interview with tobacco cultivaters and took photos, collected the samples of soil,black sand and cured tobacco from study areas.

Analysis of Physico chemical properties Soil

Soil sample were collected from two study sites put in a polythene cover and labelled and taken to the laboratory at Kerala A agricultural University campus Padannakad, kasaragod for further processing and analysis. The soil sample were air dried in the shade and a part of the air dried soil was ground manually with wooden blocks and passed through 2mm mesh prior to termination of physico chemical properties. Selected properties like P^H, EC, Ca, Mn, organic carbon, P, K, Mg, Zn, B, Fe, Cu were analysed.

Determination of Nicotine concentration from tobacco that cultivated in different agronomical condition by using UV spectrophotometer.

Each of the tobacco samples (2gm) was placed in a 100 mL beaker with 10 mL methanol and was crushed in mortar and pestle for 30 min. Distilled water of 25 mL was added, followed by 1 mL of 2M sodium hydroxide, and was stirred into the solution for another 30 min. The mixture was heated in a water bath for 6min without leaving it to boil. It was then cooled and filtered through a No. 41 ash less Whatman filter paper in to a 50 mL volumetric flask. 1 mL of 0.1 M Zinc acetate solution and 1 ml of 0.1M potassium hexacyanoferrate (II) solution were added into the filtrate and shook slowly to mix. Distilled water was added to complete the volume to the mark. The mixture was centrifuged at 3,600 rpm for 5 min. The supernatant liquid was collected into a 50 mL beaker, and the residue was discarded. Activated carbon of 1 mg was added, mixed thoroughly, and allowed to settle for 2 min before 5 mL of 0.01 M sodium hydroxide was added. The mixture was filtered through a No. 41 ash less Whatman filter paper in to a 50 mL volumetric flask. Distilled water was added to complete the volume to the mark. The extraction of solutions from two tobacco samples was performed in accordance with the UV spectrophotometer, HITACHI U-2000, at a wave length at 602 nm to determine the nicotine concentration.

RESULTS

Tobacco cultivation practices

There are common production practices that farmers employ when growing tobacco. These include land preparation, seedling transplanting, irrigation, crop management, topping, harvesting and curing.cultivation started on July t month with seed sawing and production of seedlings. After 2 month seedling is transplanted to field. manure used are fish meal, black gram cake and green manure. After 3 month the tip of the plant is plucked when the plants get mature harvesting and curing is done. After 25 days of air curing tobacco leaves(Fig1A) are started to packed one above the other (fig 1B**)** and between this packing black sand taken from 6 feet pit near the sea were dusted and cashew juice water is also sprayed inorder to prevent contamination. The total cultivation time is Julyt-March and 2 month for curing (April and May). The cured tobacco eventually makes its way to ware house where it is graded and bought by marketing companies mainly Banglore and Karnataka etc and produce chewing tobacco and cigerettes .Stem of the tobacco(fig 1C,D) is used as derivatives of nicotine used by Gowda people of Karnataka so the stem is also transported after drying.

Fig1. Processing of tobacco leaf and stem (A) Air drying (B) package of dried tobacco leaf (c)tobacco stem (D) Package of dried tobacco stem

Morphology of tobacco plants

In kasaragod Dist *Nicotiana tabacum* L grows in different agronomical, geographical and climatic conditions. kuniya region is a midland area (225 ft MSL) have black soil with High organic carbon and sulphur. Mature Plant have about 1m height with small sized leaf (Fig 2A, B). Pallikara region is the coastal area (21ft MSL) with sandy soil. Here plant have 2m height with large sized leaf than kuniya region (Fig 2C,D).

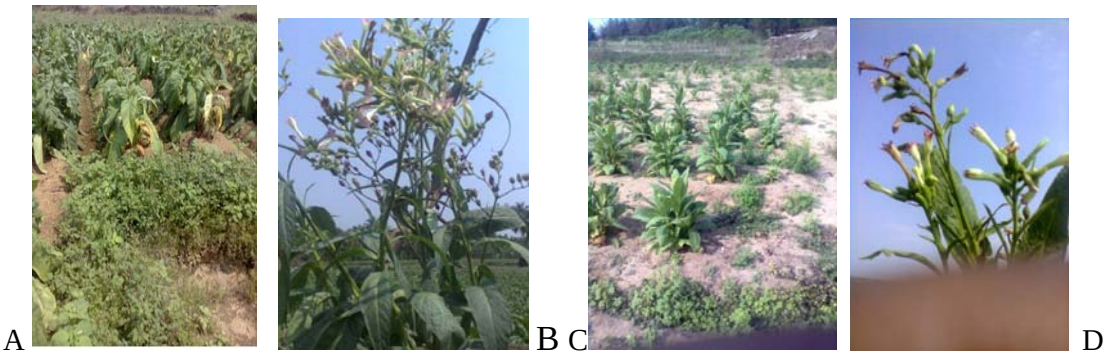

Fig2.Tobacco field of Kuniya region (A) Before flowering (B) Flowering season Tobacco field Pallikara region (C) Before flowering (D) Flowering season

Chemical constituents and medicinal aspects of tobacco

Phytochemical screening of tobacco reveals it have 16 chemicals and have medicinal properties .leaves are bitter , narcotic anti inflammatory ,anthelmintic ,carminative ,;laxative ,mental stimulant and tonic. They are useful in bronchitis, asthma haemorrhages, dyspepsia, scabies, ulcer,painful tumours,hernia etc. Chemicals reported are Nicotine, narnicotine, anabasine, I-noricotine,d-n ornicotine, nicotimine, nicotyrine,piperidine,pyrrolidine,N-mewthyl pyrroline, N-methyl I-anabasine, N-methyl I-anatabine, 2,3-dipyridyl –I- anabasine, I-anatabine,Necotelline,myosmuine and I-nicotine.(Ref: SS.Purohit *et al* .2003. *A hand book of medicinal plants)* [11].

Analysis of soil

Quality of soil is an important factor for the cultivation of any crop. Here *Nicotiana tabacum* grown in different agronomical condition and this soil is analyzed physicochemically by standard methods.

Kuniya region

Located $12^{0}25^{'}13.54"N$ $75^{0}04'56.05"E$ belongs to Pullur Periya Panchayath and it is the midland area have 225 ft MSL. Here the soil type is black and its analysis report reveals **(**Table 1) that it has high organic carbon (1.8947 %), sulphur (4.02 mg/ kg) and Fe (2.92 mg/k g) content. Other macro and micro elements have limited value.

Table 1: soil analysis of kuniya region

Physico- chemical properties	value
pH	4.06
EC	0.069
Organic carbon (%)	1.89
Phosphorus(kg/ha)	0.45
potash(kg.ha)	0.224
Mg(mg/.kg)	0.044
Ca(mg/kg)	2.1
S(mg/kg)	4.02
B(mg/kg)	0.3
Fe(mg/kg)	2.92
Zn(mg/kg)	0.057
Cu(mg/kg)	0.086
Mn(mg/kg)	0.001

Pallikara region

Located12022'39.34"N $75^0$02'46.59"E and belongs to pallikara panchayath nearest to Bekal fort, sea coast of Arabian Sea. It have 21 ft MSL.here the soil type is sandy. Analysis report reveals (Table 2) that it has organic carbon (0.1578 %), sulphur (3.70 mg /kg), Fe (3.16 mg/kg) content (Table2**).**

Table-2: Soil analysis of Pallikara region

Physico- chemical properties	Value
pH	6.22
EC	0.016
Organic carbon (%)	0.1578
Phosphorus(kg/ha)	0.15
Potash(kg.ha)	0.024
Mg(mg/.kg)	0.0362
Ca(mg/kg)	21.56
S(mg/kg)	3.70
B(mg/kg)	0.3
Fe(mg/kg)	3.16
Zn(mg/kg)	0.061
Cu(mg/kg)	0.088
Mn (mg/kg)	0.0838

Concentration of Nicotine in tobacco of two different agronomic regions.

Nicotine concentration of two tobacco sample one from Kuniya region and latter from Pallikara region were determined. These two areas were Geographically and Agronomicaly different. Pallikara region is a loose sandy area with 21 feet MSL. Soil analysis results here the nutrient level is lower than kuniya region. Nicotine concentration of cured dry tobacco leaves determined by using UV Spectrophotometer .It reveals the nicotine concentration of Pallikara tobacco is 0.466 mg/g and Kuniya tobacco is 0.598 mg/g (Table 3). These results proved that the nicotine concentration of kuniya tobacco is more than that of pallikara tobacco. It is due to the high quality of soil of kuniya region.

Table 3. UV Spectrophotometer analysis of Nicotine content of *Nicotin tabacum* L Cultivated in two different Agronomic and Geographic conditions Kasaragod Dist of Kerala.

S No	*Nicotiana tabacum* samples	Nicotin concentration (mg/g)
1	Kuniya region	0.598
2	Pallikara region	0.466

DISCUSSIONS

Besides soil the other requirements factor which affect tobacco growth are humidity, wind, rainfall, temperature, relative humidity, sunlight etc affect marked influence of flowering and metabolism of tobacco plants. To maintain turgidity and expansion of its enormous leaf area, tobacco plant need considerable amount of water. Tobacco cultivation is an ecofriendly cultivation and use only biofertilizers like decaying fish, Bengal gram cakes and green manure. But cultivaters face labour problems, lack of experienced expert workers, tourism of coastal area, influence of building developers, rise in the cost of manures, no subsidy from govt etc. Recent reports say that the production of tobacco is decreasing year to year in the kasaragod dist.

CONCLUSION

Tobacco is the annual solanaceous plant and is the widely cultivated non food crop chosen by farmers from more than 120 countries because of its performance under widely varying climatic and soil conditions to meet the demands of many different markets. Kasaragod dist. is the only dist of Kerala that produce *Nicotiana tabacum* L. Pullur Periya, Ajanoor and Pallikara panchayath are the main areas of tobacco cultivation of this dist. Here tobacco is cultivated in different agronomic and geographical conditions. Tobacco Cultivated in kuniya region of Pullur Periya panchayath have more nicotine content compared to the tobacco cultivated in sea coast area of Pallikara that belongs to pallikara panchayath due to the nutritive soil present in this region. *Nicotiana tabacum* L cultivation results in more benefit without more effort. It is the need of hours to protect this endemic crop of Kerala for the welfare of society and future generations.

ACKNOWLEDGEMENTS

Authors are thankful to Principal and Management of Sir Syed College Taliparamba, Kannur-Kerala for providing the laboratory facilities for research work.

REFERENCES

[1] Coskin Gulser., Zeynep Demir., Serkan ic. 2010. Changes in some soil properties at different incubation periods after tobacco waste application .Jl of Environmental biology vol 31(5): pp671-674.

[2] S,Suryani., Titia Izzati., Ahmad MD Noor. 2012. Analysis of Nicotine content in some of the popular cigarette and tobacco brands in Malaysia. Jl of Sci.Int (Lahore) vol 24(2), pp139-141.

[3] Anupama Asthana ., Rachana Rustogi., G,Sunita., V,K,Gupta. 2004. A simple Spectrophotometric method for the determination of Nicotin e in environmental sample. Jl of the Chinese chemical society vol 51, pp 949-53.

[4] Laura Gasoni ., Nancy Khan ., Kazunari Yokoyama., Guido H Chiessa ., Kiroku Kobayashi. 2008. Impact of Trichoderma harzianum biocontrol agent on functional diversity of soil microbial community in Tobacco monoculture in Argentina. World Jl of Agricultural sciences. Vol 4 (5): pp527-532.

[5] Zhaojingying 1998. Studies on nutrient supplying properties of different soil types for tobacco. Jl. of Henan Agricultural Univeresity , pp51.

[6] Haisheng Chen ., Yongfeng Yang., Zhengxian Tong., Guoshun LW 2009.Evaluation of of Tobacco soil fertility suitability of the Sanmenxia area, China based on G eographic Information system. Front Biochina. Vol 4(4):pp 453-459.

[7] Liu Yuni., Dvan Feng Yun2. 2008. Effect of different soil on Aroma compon ent of Flue –cured tobacco K326. Jl of Kunming University 2008-04.

[8] M,H,Biglouei., M,H Assimi., A,Akbar zadeh. 2010. Effect of soil water stress at different growth stage on quality traits of Virginia (flue- cured) tobacco type. Plant Soil Enviro 56, 2010(2) : pp 67-75.

[9] Greg,D, Hoyt.2000. The effect of tillage system on Barley tobacco yield and nitrogen uptake patterns. Tobacco Science, Vol No 5-6.

[10] Andeyani., Alfuqing 2. 2010 . Kinds and fertility of soil for tobacco cultivation in Tongren region. Guizhou Agricultural Science. 2010-06

[11] SS.Purohit.2003. A Hand Book of Medicinal Plants.