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# Response of Nandyala Pogaku-1(NBD-119) Bidi Tobacco (*Nicotiana tabaccum L.* ) to Nitrogen levels and Topping Under Rainfed conditions in Vertisols of Andhra Pradesh

**K Prabhakar, P Pulli Bai , J Manjunath, Y Padmalatha, P Muniratnam and B Gopal reddy**
Regional Agricultural Research Station, Nandyal, Kurnool dt. Andhra Pradesh, India.

**ABSTRACT**

To study the response of Nandyal Pogaku -1(NBD-119) a newly released bidi tobacco variety to nitrogen levels and topping, an experiment was conducted for two *kharif* seasons (2014 – 15 and 2015 – 16 ) at Regional Agricultural Research station, Nandyal, Andhra Pradesh with three nitrogen levels i.e. 90 kg/ha,110 kg /hand 130 kg /ha and three topping stages i.e. 12 leaf,15 leaf and 18 leaf stage and two varieties viz Nandyala pogaku-1(NBD-119) and A-119 (local popular variety) in a split-split plot design, replicated thrice. The variety Nandyala pogaku-1(NBD-119) recorded significantly higher cured leaf yield (1816 kg/ha) than A-119 (1588 kg/ha) . Application of 130 kg nitrogen /ha recorded significantly higher cured leaf yield (1959 kg/ha). Topping at 18 leaf stage recorded significantly higher cured leaf yield (1991 kg/ha). Leaf quality parameter in terms of spangle score was significantly higher with Nandyala pogaku-1(NBD-119) (3.35) and decreased significantly when topping was performed at 15 and 18 leaf stage. Nicotine percentage and reducing sugars percentages were not influenced by different nitrogen levels as well as topping stages.

Key words: *Cured leaf yield, Nandyala pogaku-1(NBD-119), Nitrogen, Topping* .

Tobacco (*Nicotiana tabacum* L.) is the most important non-food crop cultivated in more than 100 countries. It is one of the most important commercial crops of India, valued for its leaf containing nicotine. It is grown over an area of 1.22 lakh ha with production of 185 millian kg in Gujarat, Karnataka, Maharastra and Andhra Pradesh states ( Lakshminarayana,1990). The package of production technology for tobacco crop involves growing of improved varieties, key agronomic operations including application of optimum dose of nitrogen and topping. In this connection it was felt necessary to study the response of Nandyala pogaku-1(NBD-119) a recently released variety to nitrogen and topping stage for harvest of maximum yields with high leaf quality.

## MATERIAL AND METHODS

A field experiment was conducted at Regional Agricultural Research Station, Nandyal under rainfed conditions during *kharif* 2014-15 and 2015-16. The soils of experimental site are medium deep black, low in organic carbon (0.36 %), high in available $P_2O_5$ (45-50 kg/ha) and available $K_2O$ (536 kg/ha). The experiment was conducted in a split-split plot design with Nandyala pogaku-1(NBD-119) and A-119 ($V_1$ and $V_2$, respectively), assigned to main plots and three nitrogen levels viz., 90 kg ,110 kg,130 kg N/ ha as sub plots and three topping stages viz., $12^{th}$ leaf,$15^{th}$ leaf and $18^{th}$ leaf stage were considered as sub- sub plots . Each plot consisted of six rows of 6.75 m length and 75 cm apart. While, the distance between plants on each row was 75 cm. Crop management factors like land preparation, P and K fertilizer application, weed control, intercultivation, need based plant protection, de suckering and sun curing were followed as recommended for local area. The seeds were sown in nursery during $2^{nd}$ FN of July and healthy seedlings were transplanted at 45 days age during $2^{nd}$ FN of September . Both the varieties attained maturity in 120 days. Green leaves were detached and sun cured for 11days.

Experiment was conducted purely under rainfed condition. An amount of 644.2 mm and 732.0 mm of rainfall was received during crop season (July to December) of 2014 and 2015, respectively. Rainfall distribution was highly erratic coupled with prolonged dry spells in the month of

August followed by continuous heavy rainfall in the month of September during the both years. The data were recorded on ten randomly selected plants of each entry of each replication for plant height, leaf length, leaf width, leaf thickness and leaf area.

Dry matter partitioning, green leaf yield and cured leaf yield at harvest were recorded . Leaf quality parameters like spangle score, nicotine percentage and reducing sugars percentage were also recorded at harvest.

## RESULTS AND DISCUSSION

### Response of varieties

The variety Nandyala pogaku-1(NBD-119) recorded 95.19 cm height (Table 1) which was at par with A-119 variety. (94.46 cm) Significantly higher leaf length (43.1cm), leaf width (18.9 cm ) and leaf thickness (3.5 mg $cm^{-2}$) were recorded with Nandyala pogaku-1(NBD-119) as compared to variety A-119 (36.1 cm,16.77 cm and 3.33 mg $cm^{-2}$ , respectively). This variety also recorded higher leaf area (1.52 $m^2$), stem dry weight per plant (81.19 g) and comparable with check variety A-119. While, significantly higher leaf dry weight per plant (95.7g) was recorded with Nandyala pogaku-1(NBD-119) as against 89.9g/ plant with A-119 variety at maturity which might be due to the different genetic constitution of the varieties, giving significant results in the growth parameters of plant. Similar results were also reported by Gupta *et al* ( 2014) in bidi tobacco. However the interaction between these two factors was significant for all parameters recorded.

Nandyala pogaku-1(NBD-119) recorded significantly higher (Table 2) green leaf (15301 kg/ ha) and cured leaf yield (1816 kg/ha) over check variety A-119 (12398 kg/ha and 1588 kg/ha respectively). Significantly higher leaf length, leaf width, leaf thickness and leaf dry weight per plant might have contributed to higher green leaf yield and cured leaf yield in Nandyala pogaku-1(NBD-119). Significantly higher spangle score (3.35) was recorded with Nandyala pogaku-1(NBD-119) which shows the superior leaf quality with that variety. Different genetic constitutions of the variety which lead to significant results in the growth parameters of plant might have contributed for recording higher yields .

### Response of varieties to nitrogen levels

Significantly higher plant height, leaf length, leaf width, leaf thickness, leaf area, dry matter production of stem, leaf dry weight per plant were recorded with 130 kg nitrogen/ha which was at par with 110 kg nitrogen /ha . Patel et al (2003) also reported that application of nitrogen upto 220 kg/ ha has significantly increased the growth score and leaf width of bidi tobacco

**Table 1. Plant growth characters of bidi tobacco varieties as influenced by nitrogen levels and topping stages (pooled for 2014-15 and 2015-16).**

| Treatments | Plant height (cm) | Leaf length (cm) | Leaf width (cm) | Leaf thickness (mg $cm^{-2}$) | Leaf area ($m^2$) |
|---|---|---|---|---|---|
| **Main plots- Varieties** | | | | | |
| $V_1$:Nandyala pogaku-1 (NBD-119) | 95.19 | 43.1 | 18.9 | 3.50 | 1.52 |
| $V_2$: A-119 | 94.46 | 36.1 | 16.77 | 3.33 | 1.50 |
| CD (p=0.05) | NS | 0.7 | 0.60 | 0.15 | NS |
| **Sub plots-N Levels** | | | | | |
| $N_1$: 90 Kg/ha | 92.49 | 33.1 | 16.21 | 3.28 | 1.45 |
| $N_2$: 110kg/ha | 95.26 | 37.9 | 17.66 | 3.47 | 1.56 |
| $N_3$:130kg/ha | 96.73 | 37.8 | 19.64 | 3.48 | 1.52 |
| CD (p=0.05) | 2.59 | 1.7 | 0.54 | 0.07 | 0.05 |
| **Sub –sub plots-Topping Stages** | | | | | |
| $T_1$: 12 Leaf stage | 84.01 | 42.4 | 18.68 | 3.61 | 1.33 |
| $T_2$: 15 Leaf stage | 96.06 | 38.2 | 17.51 | 3.33 | 1.54 |
| $T_3$: 18 Leaf stage | 104.41 | 38.2 | 17.32 | 3.29 | 1.66 |
| CD (p=0.05) | 3.89 | 2.4 | 0.58 | 0.05 | 0.02 |

**Table 2. Dry matter partitioning, yield and quality of bidi tobacco varieties as influenced by nitrogen levels and topping stages (pooled for 2014-15 and 2015-16**

| Treatments | Stem dry weight (g/plant) | Leaf dry weight (g/plant) | Spangle score | Green leaf yield (kg/ha) | Cured leaf yield (kg/ha) | Nicotine% | Reducing sugars % |
|---|---|---|---|---|---|---|---|
| **Main plots- Varieties** | | | | | | | |
| $V_1$:Nandyala pogaku-1 (NBD-119) | 81.19 | 95.7 | 3.35 | 15301 | 1816 | 3.66 | 2.29 |
| $V_2$: A-119 | 85.05 | 89.9 | 2.98 | 12398 | 1588 | 3.68 | 1.64 |
| CD (p=0.05) | NS | 2.9 | 0.25 | 420 | 210 | NS | NS |
| **Sub plots-N Levels** | | | | | | | |
| $N_1$: 90 Kg/ha | 79.08 | 86.1 | 3.15 | 12285 | 1376 | 3.85 | 1.85 |
| $N_2$: 110kg/ha | 84.19 | 95.7 | 3.12 | 13999 | 1769 | 3.57 | 1.93 |
| $N_3$:130kg/ha | 86.10 | 96.7 | 3.23 | 15264 | 1959 | 3.60 | 2.13 |
| CD (p=0.05) | 4.55 | 2.7 | NS | 753 | 83 | NS | NS |
| **Sub –sub plots-Topping Stages** | | | | | | | |
| $T_1$: 12 Leaf stage | 80.27 | 90.6 | 3.81 | 10414 | 1231 | 3.62 | 2.29 |
| $T_2$: 15 Leaf stage | 83.17 | 94.0 | 3.24 | 15470 | 1882 | 3.59 | 2.14 |
| $T_3$: 18 Leaf stage | 85.93 | 93.7 | 2.44 | 15665 | 1991 | 3.81 | 1.47 |
| CD (p=0.05) | NS | 2.3 | 0.18 | 646 | 64 | NS | NS |

Pooled analysis of yield data (Table 2) revealed that green as well as cured leaf yield increased with increase in nitrogen levels . Application of 130 kg nitrogen/ha recorded significantly highest (15264 kg/ha) green leaf and 1959 kg cured leaf yield / ha. While, 110 kg nitrogen recorded 13999 kg green leaf and 1769 kg of cured leaf yield / ha which were significantly superior to 90 kg nitrogen /ha . The influence of nitrogen levels on spangle score was not found indicating that application of higher doses of nitrogen may help for higher cured leaf yield without affecting the leaf quality. Gediya *et al* (2008) concluded that A-119 bidi tobacco variety responds to higher level of nitrogen level compared to lower level of 180 kg N/ha.

**Response of varieties to topping stages**

Significantly highest plant height was observed when plants were topped at 18 leaf stage and significantly lowest with 12 leaf stage topping ( Table 1). Among three topping stages tested, significantly highest leaf length, leaf width and leaf thickness were recorded (Table1) with 12 leaf topping treatment .While, leaf area, leaf dry weight at harvest stage were significantly higher with 15 leaf topping which was at par with 18 leaf stage. Sangave *et al* (1997) also concluded that 16-18 leaf on main stem with recommended dose of fertilizer is better for getting higher yield and superior quality tobacco.

Among topping stages, there was an increase in leaf yield with increase in leaf stage of topping. Topping at 18 leaf stage recorded significantly higher (Table2) green leaf yield (15665 kg/ha) and cured leaf yield (1991 kg/ha) but at par with 15 leaf stage. Significantly higher spangle score was recorded with 12 leaf stage topping (3.81). While, the lowest spangle score was recorded in 18 leaf stage (2.44) though cured leaf yield were maximum which is an important leaf quality parameter at the time of maturity. Similarly Bglar poor sadri and behghan zade **(**2014) reported that topping at early growth stage and controlling sucker growth with using suckericide enhanced tobacco leaf quality in field.

**Interaction effect**

The variety Nandyala pogaku-1(NBD-119) recorded significantly higher cured leaf yields under all three nitrogen levels and topping stages over A-119 variety and recorded comparable yields (Table 3). Nandyala pogaku-1(NBD-119) variety has recorded significantly higher cured leaf yield with 130 kg nitrogen /ha and 15 leaf topping stage (2526 kg/ ha) and comparable with 18 leaf topping

**Table 3. Interaction effect of bidi tobacco varieties, nitrogen levels and topping stages on cured leaf yield during *kharif* (pooled for 2014-15 and 2015-16).**

| Variety/nitrogen level | Topping leaf stage | | |
|---|---|---|---|
| | 12th leaf | 15th leaf | 18th leaf |
| $V_1$ $N_1$: Nandyala pogaku-1(NBD-119) at 90 kg N/ha | 1203 | 1628 | 1598 |
| $V_1$ $N_2$: Nandyala pogaku-1(NBD-119) at 110 kg N/ha | 1384 | 1972 | 2049 |
| $V_1$ N3: Nandyala pogaku-1(NBD-119) at 130 kg N/ha | 1552 | 2526 | 2430 |
| $V_2$ $N_1$: A-119 at 90 kg N/ha | 782 | 1279 | 1766 |
| $V_2$ $N_2$: A-119 at 110 kg N/ha | 1050 | 2046 | 2117 |
| V2 $N_3$: A-119 at 130 kg N/ha | 1416 | 1844 | 1989 |
| C.D.(P=0.05) V x N | | 117 | |
| C.D.(P=0.05) V x T | | 91 | |
| C.D.(P=0.05) N x T | | 112 | |
| C.D.(P=0.05) V x N x T | | 158 | |

V=Variety, N= Nitrogen level, T= Topping stage

stage (2430 kg /ha) and low yields with 12 leaf stage topping .This variation might be due to the genetic makeup factors of the cultivars.

However ,it was recorded that nicotine percentage and reducing sugars percentage were similar with Nandyala pogaku-1(NBD-119) , A-119 at all nitrogen levels and topping stages. Sangave *et al* (1997) reported that nitrogen, nicotine, chloride, potassium and ash increased with increase in fertilizer level or recommended dose of fertilizer whereas reducing sugar content decreased. However, Marowa Prince *et al* (2015) reported that there is still need to establish the nitrogen and priming levels which may vary with place and variety.

Hence, it is concluded that Nandyala pogaku-1(NBD-119) variety was found superior for most of the growth parameters and cured leaf yield as compared to varieties A119 at all nitrogen levels and topping stages and can be recommended for commercial cultivation in rainfed conditions.

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