







media containing control (no hormone) were found to produce the minimum leaf number (0.67 and 1.3) in 15 and 30 DAI respectively.

As regard to maximum number of leaves obtained the result relatively agree with Demissie (2013), that he found maximum number of leaves at 10, 20, 30 and 60 DAI produced on the medium supplemented with 5 mg/l BAP and 0.5 mg/l NAA were 1.67, 2.67, 3.67 and 4.33 leaves per explants respectively. Rahman *et al.*, (2004) found the maximum number of leaves (3.12 per explants at 30 DAI produced with 5.0 mg/l BAP, which was similar with the present study. In this study lowest number were of leaves obtained by control which does not agree with the finding of Al-Amin *et al.*, (2009) but agree with Rabbani *et al.*, (1996) and Rahaman *et al.*, (2004) where they did not monitored any leaves formation at different dates interval after inoculation.

### 3.5 Effect of BAP, NAA and combination on a length of leaves.

The mediums supplemented with different BAP levels were statistically significant. The longest leaf recorded in 5 mg/l

BAP at both 15 DAI and 30 DAI; whereas NAA levels 2.0 mg/l NAA reported longest leaf length on both days after inoculation in comparison with other treatments. NAA level does not significantly influenced the length of leaves.

As regard to the interaction, the lengths of plantlets were not statistically significant. The longest leaves were produced by combination of 5 mg/l BAP + 2.0 mg/l NAA at 15 and 30 DAI which were 4.43 and 5.27 cm respectively. This investigation disagree with results of Al-Amin *et al.*, (2009) that they found the longest leaves by the treatment concentration of 7.5 mg/l BAP +0.5 mg/l NAA treatment (0.85, 2.70, 4.23 cm at 10, 20 and 30 DAI respectively).

But this result slightly agree with Rahman *et al.*, (2004) and they obtained longest leaves in the treatment 5.0 mg/l BAP (3.62 cm followed by 1.5 mg/l NAA and 4.0 mg/l BAP (3.40 cm) using BARI-Banana -1. In contrary they found shortest leaves in 2.0 mg/l BAP. But in this experiment the shortest leaf length was produced by control treatment of BAP and 0.5 mg/l NAA (1.07 and 1.30 cm) 15 and 30 DAI, respectively.

**Table 2:** Effect of different concentrations of BAP, NAA and interaction on number of leaves and leaf length

Factors	No. of Leaves		Leaf length (cm)	
	15 DAI	30 DAI	15 DAI	30 DAI
A:- BAP Level				
A1= BAP 0.0 mg/L	1.4 (1.35)de	2.4 (1.67)de	1.2de	1.5e
A2= BAP 2.5 mg/L	2.2(1.63)bcd	3.2 (1.93)bc	2.0bc	2.3cd
A3= BAP 5.0 mg/L	3.4 (1.98)a	4.4 (2.22)a	3.4a	3.9a
A4= BAP 7.5 mg/L	2.5 (1.72)bc	3.2 (1.91)bc	2.5bc	3.1b
A5= BAP 10 mg/L	1.9(1.53)cde	2.5 (1.73)de	1.7de	2.0cd
SEm (±)	0.21	0.18	0.26	0.27
CD at 5%	0.59	0.51	0.74	0.77
B:- NAA Level				
B1= NAA 0.0 mg/L	2.0 (1.53)	2.6 (1.75)e	1.8	2.1
B2= NAA 0.5 mg/L	2.3 (1.65)	3.2(1.92)abcd	2.0	2.4
B3= NAA 1.0 mg/L	2.2 (1.64)	3.2(1.91)abcd	2.1	2.6
B4= NAA 1.5 mg/L	2.6 (1.75)	3.4(1.98)abcd	2.4	2.8
B5= NAA 2.0 mg/L	2.3 (1.65)	3.2(1.91)abcd	2.5	3.0
SEm (±)	0.21	0.18	0.26	0.27
CD at 5%	NS	0.51	NS	NS
C:- Interaction A*B				
A1B1	0.67 (1.052)	1.33 (1.290)	0.00	0.00
A1B2	1.33 (1.344)	2.33 (1.678)	1.07	1.30
A1B3	1.67 (1.462)	2.67 (1.774)	1.83	2.30
A1B4	2.00 (1.559)	3.00 (1.858)	2.10	2.50
A1B5	1.33 (1.344)	2.67 (1.774)	1.33	1.80
A2B1	2.67 (1.774)	3.00 (1.871)	1.90	2.10
A2B2	2.33 (1.678)	3.67 (2.038)	2.10	2.43
A2B3	2.00 (1.559)	3.33 (1.954)	2.03	2.37
A2B4	2.00 (1.581)	3.33 (1.954)	1.77	2.20
A2B5	2.00 (1.559)	3.00 (1.858)	2.40	2.77
A3B1	3.33 (1.954)	4.00 (2.112)	2.97	3.37
A3B2	3.67 (2.038)	4.67 (2.270)	2.63	3.03
A3B3	3.33 (1.954)	4.33 (2.196)	3.53	3.97
A3B4	3.00 (1.858)	4.00 (2.112)	3.73	4.23
A3B5	4.00 (2.112)	5.33 (2.413)	4.43	5.27
A4B1	2.33 (1.678)	3.00 (1.871)	2.43	2.90
A4B2	2.33 (1.656)	3.33 (1.941)	2.87	3.33
A4B3	2.33 (1.678)	3.00 (1.871)	1.83	2.40
A4B4	3.33 (1.954)	3.67 (2.038)	2.80	3.33
A4B5	2.33 (1.678)	3.00 (1.871)	3.02	3.57
A5B1	1.00 (1.225)	2.00 (1.581)	2.00	2.33

A5B2	2.00 (1.559)	2.33 (1.678)	1.67	2.00
A5B3	2.00 (1.599)	2.67 (1.774)	1.73	2.20
A5B4	2.67 (1.774)	3.33 (1.954)	1.67	2.07
A5B5	2.00 (1.559)	2.33 (1.678)	1.55	1.80
SEm (±)	0.47	0.40	0.58	0.61
CD at 5 %	NS	NS	NS	NS
G.M	2.3	3.17	2.21	2.62

: - All values in the brackets are transformed: All values with same letter are not significant.

#### 4. Conclusion

From this study, for shoot establishment and proliferation of banana cv. Grand naine; BAP concentration of 5 mg/l was recorded as suitable concentration on days to shoot induction. Also it was observed that 5 mg/l BAP was superior over other concentration on shoot number, shoot length, leaf number and leaf length both at 15 and 30 DAI.

Among different level of NAA concentration used the best performed are, controlled level for days to shoot induction, 0.5 mg/l NAA for shoot number, 1.5 mg/l NAA for length of shoot and number of leaves and 2.0 mg/l NAA for length of leaves were seen best performing treatment as to compare others.

As interaction concerned, 5 mg/l BAP + 0.0 mg/l NAA was best on rapid initiation of shoot and for highest shoot number. In other hand, 5 mg/l BAP + 2.0 mg/l NAA were proved best for length of shoot, number of leaves and length of leaves at both 15 and 30 DAI. It had shown that linear relationship between effects of hormones on the alone and on interaction.

The proliferation rate were shown increasing trend from 15 DAI to 30 DAI in most treatments. Higher and controlled concentration of growth regulators were shown limited growth and proliferation.

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