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In vitro the various concentrations of BAP (6-Benzylaminopurine) supplemented in different culture media for shoot proliferation of *Aloe vera* (*Aloe barbadensis* Miller)

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Abstract
Aloe vera is medicinal herb growing in tropical and subtropical latitudes with very good economic potential. It has been used as botanical medicines in many countries for thousands of year, they are used for preparing food, feed, and beverages, formulating ethno medicinal and ethno veterinary remedies and preparing traditional and modern cosmetic products. An efficient protocol for rapid *in vitro* propagation of valuable medicinal plant *Aloe vera* by using shoot tip and nodal cutting as explants were done. Brahmi and *Aloe vera* is likely to become a major source of a number of medicinal products of high value in the coming future. It is imperative to convert *Aloe barbadensis* from wild plant to plant suited to meet the huge demand of the industries. *Aloe vera* is the best known today for its ability to treat burns; it has been used for treating stomach disorders, headache, constipation, influenza and fever, colic, kidney ailments, ringworms skin, hemorrhoids, wounds, dystrophy, blistering, sunburn, menstrual problems, insomnia, snakebite, hair loss, meningitis and other elements. The present work deals with the establishment of a viable protocol for this valued medicinal plant. Out of ten different treatments regime tried for induction and multiplication on shoots explants^{-1}. Taken two types of media *i.e.* MS media and B_5 media supplemented with different doses of plant growth regulators *i.e.* 1 mg/L of BAP, 2 mg/L BAP, 3 mg/L BAP, 4 mg/L BAP and 5 mg/L BAP for shoot induction and data to be recorded at weekly interval from first week to six weeks. Resulted that media MS was given best response at weekly interval, supplemented with different doses of plant growth regulators (*i.e.* 1 mg/L of BAP, 2 mg/L BAP, 3 mg/L BAP, 4 mg/L BAP and 5 mg/L BAP) for shoot induction per explants of *Aloe vera* as compare to B_5 media. Doses 3.0 mg/l BAP supplemented in MS media and B5 media was found best to induce maximum number of shoots per explants followed by 4.0 mg/l BAP in *Aloe vera*. Explants nodal cutting was done highly shoot proliferation with MS media and doses of plant growth regulators as compare to shoot tip explants of *Aloe vera*.

Keywords: Shoot tip and nodal cutting, media MS, B_5 and doses of BAP

Introduction
Aloe vera, a plant with many benefits, can rightly be called as a "Medicinal Miracle." It belongs to the family Alliaceae and genus Aloe containing about 420 species (Dange *et al*., 2000) [9]. This perennial succulent plant has the ability to develop water storage tissue in the leaves to survive in dry conditions with low or erratic rainfall (Kumar and Yadav, 2014) [15]. The leaves of this plant contain fat compounds, carbohydrates, proteins, lipids, and 18 essential amino acids, vitamins (e.g., A, C, E, vitamin B12, folic acid), minerals, glycoprotein, glucosylchromone, anthraquinones, emodin, salicylic acid and various kinds of enzymes (Hamman, 2008) [12]. It also contains secondary metabolites like alkaloids, aloins, lectins, lignin, saponins, tannins, phenolic and glukomannan (Boudreau and Beland, 2006; Darini *et al*., 2013) [4, 10]. Its cultivation is expanding rapidly as it provides quick and regular income to the farmers (Moorthy and Malliga, 2012) [20]. Aloe gel possesses important biological properties such as anticancer (Naveena *et al*., 2011) [21], antioxidant (Miladi and Damak, 2008) [18], antidiabetic (Jones, 2007) [14], and many more medicinal activities. The ten main chemical constituents of *Aloe vera* include amino acids, anthraquinones, enzymes, minerals, vitamins, lignins, monosaccharide, polysaccharides, salicylic acid, saponins, and sterols.It contains numerous bioactive components that prove to be beneficial for humans in a variety of ways.
Aloe vera is a perennial monocot plant with turgid green leaves joined to the stem in a rosette pattern. Aloe leaves consist of a thick epidermis (skin) covered by a cuticle surrounding the mesophyll that includes Chlorenchyma cells and thinner walled cells that form the parenchyma

(filet). The mesophyll cells contain a transparent mucilaginous jelly called *Aloe vera* gel. *Aloe vera (Liliaceae*), is a succulent plant indigenous to Northern Africa and Mediterranean countries and has become naturalized almost in all parts of India. The plant has stiff gray-green lance-shaped leaves containing clear gel in a central mucilaginous pulp. *Aloe vera* has been used for several thousands of years in folk medicine in many cultures from ancient Egypt, Greece, and Rome to China and India. *Aloe vera* propagates vegetatively in its natural state. However, propagation rate is very slow because a single plant can produce only three to four lateral shoots in a year. Moreover, the production of Aloe leaves is insufficient to meet the industry demand in India (Aggarwal and Barna 2004) [2] and the production of cosmetics, foods and pharmaceuticals containing A. vera has experienced a slow increase due to limited availability of raw material with high quality (Campestrin *et al.*, 2006) [5].

In vitro shoot proliferation mainly depends on plant growth regulators, particularly cytokinin and auxin incorporated in the culture medium. Liao *et al*. (2004) [16] and Debiasi *et al*. (2007) [11] stated that the impact of benzyladenine (BA), indole-3-acetic acid (IAA), and 1-naphthaleneacetic acid (NAA) on bud initiation.-row spacing of 45 cm and intra row spacing of 10 cm. Sowing was done by dibbling the seed at 2-3 cm depth. All the standard package of practices were followed during crop growth period. The observations were recorded for twelve yield contributing characters *viz*., days to 50% flowering, days to maturity, plant height (cm), number of primary branches per plant, number of secondary branches per plant, number of siliquae per plant, number of seed per siliqua, siliqua length (cm), 1000 seed weight (g), seed yield per plant (g), harvest index (%) and oil content (%). Data was recorded for five randomly selected plants of each genotype in both the replications. The data was subjected to analysis of variance, phenotypic and genotypic coefficients of variations and other genetic parameters like heritability and genetic advance were calculated. Correlation coefficients were calculated as per the formulae suggested by Falconer (1981) [4].

Table 1: Number of shoots explants^{-1} of *Aloe vera* in 1st and 2nd experiments. (Week I)

Treatments	Number of shoots explants^{-1} (Experiment-1st)					Number of shoots explants^{-1} (Experiment-2nd)				
	Shoot tip (ST)	Nodal cutting (NC)		Mean		Shoot tip (ST)	Nodal cutting (NC)		Mean	
M_1xD_1	0.593	0.803		0.698		0.668	0.820		0.744	
M_1xD_2	0.604	0.794		0.699		0.686	0.826		0.756	
M_1xD_3	0.793	1.206		0.999		0.818	1.209		1.0139	
M_1xD_4	0.596	1.195		0.895		0.697	1.211		0.954	
M_1xD_5	0.601	1.010		0.806		0.672	1.070		0.871	
M_2xD_1	0.002	0.0025		0.00225		0.0035	0.485		0.244	
M_2xD_2	0.003	0.0025		0.00275		0.006	0.485		0.246	
M_2xD_3	0.003	0.721		0.362		0.004	0.876		0.4401	
M_2xD_4	0.0025	0.552		0.277		0.0015	0.605		0.3033	
M_2xD_5	0.0025	0.502		0.252		0.006	0.559		0.282	
Mean	0.320	0.679		0.499		0.356	0.815		0.585	
	M_1 (MS)	M_2 (B_5)	Mean	ST	NC	M_1 (MS)	M_2 (B_5)	Mean	ST	NC
D_1 (1 mg/l BAP)	0.698	0.00225	0.350	0.297	0.402	0.744	0.244	0.494	0.336	0.653
D_2 (2 mg/l BAP)	0.699	0.00275	0.351	0.3033	0.398	0.756	0.245	0.501	0.3462	0.656
D_3 (3 mg/l BAP)	0.999	0.362	0.681	0.398	0.963	1.0139	0.440	0.727	0.411	1.043
D_4 (4 mg/l BAP)	0.895	0.277	0.586	0.299	0.873	0.954	0.303	0.629	0.3491	0.908
D_5 (5 mg/l BAP)	0.806	0.252	0.529	0.302	0.756	0.871	0.282	0.577	0.3390	0.814
Mean	0.819	0.179	0.499	0.320	0.679	0.868	0.303	0.585	0.356	0.815
	ST	NC		Mean		ST	NC		Mean	
Media (M_1)	0.637	1.0015		0.819		0.708	1.0273		0.868	
Media (M_2)	0.0026	0.356		0.179		0.0042	0.6022		0.3032	
Mean	0.320	0.679		0.499		0.356	0.8147		0.585	
	S.E. (diff)	C.D. (0.05)				S.E. (diff.)	C.D. (0.05)			
Media (M)	0.0013	0.0026		M		0.0015	0.0031			
Dose (D)	0.0032	0.0066		D		0.0037	0.0077			
Explants(E)	0.0013	0.0026		P		0.0015	0.0031			
M x D	0.0063	0.0132		M x D		0.0074	0.0154			
D x E	0.0025	0.0053		D x P		0.0030	0.0062			
M x E	0.0025	NS		M x P		0.0030	0.0062			
M x E x D	0.0127	0.0265		M x P x D		0.0148	0.0308			

Number of shoots explants^{-1} at 2nd week

Table 2 reveal that number of shoots explants^{-1} of *Aloe vera* in 2nd week of 1st experiment shows significant differences among explants both shoot (ST) and nodal cutting (NC), media MS and B_5 at different doses of BAP (*Banzyle amino purine*). Explants at nodal cutting (1.187) showed higher no. of shoots in *Aloe vera* significant difference to shoot tip (0.769). Media MS exhibit higher no. of shoots in media *i.e*. (1.267) of *Aloe vera* showed significant difference to media B_5 (0.689). Does 3 mg/L BAP (*Banzyle amino purine*) were showed higher significant difference (1.267) followed by dose 4 mg/L BAP (1.078) among other doses recorded higher no. of shoots explants^{-1} in *Aloe vera*.

In interaction of media and dose media MS and dose 3 mg/L BAP (1.591) showed higher significant difference among other interaction of media and doses followed by media MS and dose 4 mg/ L BAP (1.406). Media B_5 and dose 1 mg/L BAP (0.548) was recorded lower no. of shoots explants^{-1} in *Aloe vera*. In interaction explants and doses, explants nodal cutting and dose 3 mg/L BAP were recorded higher no. of

shoots explants^{-1} *Aloe vera* i.e. (1.601) followed by explants nodal cutting and dose 4 mg/L BAP showed no shoots explants^{-1} (1.332). In interaction level of explants and media, explants nodal cutting and media MS were recorded higher no of shoots explants^{-1} in *Aloe vera* (1.576) followed by explants shoots and media MS i.e. (0.958). Minimum no of shoot explants^{-1} were found to be in explant shoot tip and media B_5 (0.580).

Data presented in the table 2 number of shoots explants^{-1} of *Aloe vera* in 2nd week of 2nd experiment shows significant differences among no of shoots per explants both shoot (ST) and nodal cutting (NC), media MS and B_5 at different doses of BAP (*Banzyle amino purine*). Explants at nodal cutting (1.247) showed higher no. of shoots in *Aloe vera* given significant difference to shoot tip (0.790). Media MS exhibit higher no. of shoots in media i.e. (1.340) of *Aloe vera* showed significant difference over media B_5 (0.698). Doses 3 mg/L BAP (*Banzyle amino purine*) were showed higher no. of shoots given significant difference (1.321) followed by dose 4 mg/L BAP (1.127) among other doses recorded higher no. of shoots explants^{-1} in *Aloe vera*.

In interaction of media and doses media MS and dose 3 mg/L BAP (1.672) showed higher significant difference among other interaction of media and doses followed by media MS and dose 4 mg/ L BAP (1.5.0). Media B_5 and dose 1 mg/L BAP (0.518) was recorded lower no. of shoots explants^{-1} in *Aloe vera*. In interaction explants and doses, explants nodal cutting and dose 3 mg/L BAP were recorded higher no. of shoots explants^{-1} *Aloe vera* i.e. (1.673) followed by explants nodal cutting and dose 4 mg/L BAP were showed higher no shoots explants^{-1} (1.425). In interaction level of explants and media, explants nodal cutting and media MS were recorded higher no of shoots explants^{-1} in *Aloe vera* (1.650) followed by explants shoots and media MS i.e. (1.025). Minimum no of shoot explants^{-1} were found to be in explant shoot tip and media B_5 (0.552). In both experiments, explants, media and doses showed significant response, explants nodal cutting, media MS and doses 3 mg/L BAP given best response to increase higher number of shoots in *Aloe vera* and interactions were also recorded significant response at 5.0% level of significance.

Table 2: Number of shoots explants^{-1} of *Aloe vera* in 1st and 2nd experiments. (Week II)

Treatments	Number of shoots explants^{-1} (Experiment-1st)					Number of shoots explants^{-1} (Experiment-2nd)				
	Shoot tip (ST)	Nodal cutting (NC)		Mean		Shoot tip (ST)	Nodal cutting (NC)		Mean	
M_1xD_1	0.806	1.212		1.009		0.882	1.235		1.058	
M_1xD_2	0.791	1.263		1.027		0.930	1.287		1.108	
M_1xD_3	1.185	1.997		1.591		1.273	2.072		1.673	
M_1xD_4	1.010	1.802		1.406		1.037	1.969		1.50	
M_1xD_5	0.998	1.603		1.301		1.024	1.685		1.354	
M_2xD_1	0.475	0.621		0.548		0.406	0.631		0.518	
M_2xD_2	0.484	0.634		0.559		0.469	0.636		0.552	
M_2xD_3	0.682	1.204		0.943		0.663	1.275		0.969	
M_2xD_4	0.639	0.861		0.750		0.619	0.883		0.751	
M_2xD_5	0.619	0.667		0.643		0.604	0.797		0.701	
Mean	0.769	1.187		0.978		0.790	1.247		1.019	
	M_1 (MS)	M_2 (B_5)	Mean	ST	NC	M_1 (MS)	M_2 (B_5)	Mean	ST	NC
D_1 (1 mg/l BAP)	1.009	0.548	0.779	0.640	0.917	1.0586	0.518	0.789	0.644	0.933
D_2 (2 mg/l BAP)	1.027	0.559	0.793	0.637	0.948	1.108	0.552	0.830	0.699	0.961
D_3 (3 mg/l BAP)	1.591	0.943	1.267	0.933	1.60	1.673	0.969	1.320	0.968	1.674
D_4 (4 mg/l BAP)	1.406	0.750	1.078	0.825	1.331	1.503	0.751	1.127	0.828	1.426
D_5 (5 mg/l BAP)	1.300	0.643	0.972	0.809	1.135	1.354	0.701	1.0275	0.814	1.241
Mean	1.267	0.689	0.978	0.769	1.187	1.339	0.698	1.019	0.791	1.247
	ST	NC		Mean		ST	NC		Mean	
Media (M_1)	0.958	1.576		1.267		1.029	1.650		1.339	
Media (M_2)	0.580	0.797		0.689		0.552	0.844		0.698	
Mean	0.769	1.187		0.978		0.791	1.247		1.019	
	S.E. (diff)	C.D. (0.05)				S.E. (diff.)	C.D. (0.05)			
Media (M)	0.0019	0.0039				0.0027	0.0056			
Dose (D)	0.0047	0.0098				0.0067	0.0140			
Explants(E)	0.0019	0.0039				0.0027	0.0056			
M x D	0.0094	0.0197				0.0135	0.0281			
D x E	0.0038	0.0079				0.0054	0.0112			
M x E	0.0038	0.0079				0.0054	0.0112			
M x E x D	0.0188	0.0393				0.0269	0.0562			

Number of shoots explants^{-1} at 3rd week

Data presented in this table 3 number of shoots explants^{-1} of *Aloe vera* in 3rd week of 1st experiment shows significant differences among explants both shoot tip (ST) and nodal cutting (NC), media MS and B_5 at different doses of BAP (*Banzyle amino purine*). Explants at nodal cutting (1.774) showed higher no. of shoots in *Aloe vera* significant difference to shoot tip (1.232). Media MS exhibit higher no. of shoots in media i.e. (1.958) of *Aloe vera* showed significant difference to media B_5 (1.048). Does 3 mg/L BAP (*Banzyle amino purine*) were showed higher no. of shoot given in significant difference (2.016) followed by dose 4 mg/L BAP (1.628) among other doses were recorded higher no. of shoots explants^{-1} in *Aloe vera*.

In interaction of media and dose media MS and dose 3 mg/L BAP (2.490) showed higher significant difference among other interaction of media and doses followed by media MS and dose 4 mg/ L BAP (2.085). Media B_5 and dose 1 mg/L

BAP (0.697) was recorded lower no. of shoots explants^{-1} in *Aloe vera*. In interaction explants and doses, explants nodal cutting and dose 3 mg/L BAP were recorded higher no. of shoots explants^{-1} *Aloe vera* i.e. (2.421) followed by explants nodal cutting and dose 4 mg/L BAP showed no shoots explants^{-1} (1.890). In interaction level of explants and media, explants nodal cutting and media MS were recorded higher no of shoots explants^{-1} in *Aloe vera* (2.381) followed by explants shoots and media MS i.e. (1.536). Minimum no of shoot explants^{-1} were found to be in explant shoot tip and media B_5 (0.929).

Observation with respect to in this table 3 number of shoots explants^{-1} of *Aloe vera* in 3rd week of 2nd experiment shows significant differences among explants both shoot tip (ST) and nodal cutting (NC), media MS and B_5 at different doses of BAP (*Banzyle amino purine*). Explants at nodal cutting (1.871) showed higher no. of shoots in *Aloe vera* given significant difference to shoot tip (1.273). Media MS exhibit higher no. of shoots in media i.e. (2.058) of *Aloe vera* showed significant difference to media B_5 (1.086). Does 3 mg/L BAP (*Banzyle amino purine*) were showed higher no. of shoot given in significant difference (2.106) followed by dose 4 mg/L BAP (1.780) among other doses were recorded higher no. of shoots explants^{-1} in *Aloe vera*.

In interaction of media and dose media MS and dose 3 mg/L BAP (2.648) showed higher significant difference among other interaction of media and doses followed by media MS and dose 4 mg/ L BAP (2.312). Media B_5 and dose 1 mg/L BAP (0.730) was recorded lower no. of shoots explants^{-1} in *Aloe vera*. In interaction explants and doses, explants nodal cutting and doses 3 mg/L BAP were recorded higher no. of shoots explants^{-1} *Aloe vera* i.e. (2.531) followed by explants nodal cutting and dose 4 mg/L BAP showed no shoots explants^{-1} (2.155). In interaction level of explants and media, explants nodal cutting and media MS were recorded higher no of shoots explants^{-1} in *Aloe vera* (2.531) followed by explants shoots and media MS i.e. (1.584). Minimum no of shoot explants^{-1} were found to be in explant shoot tip and media B_5 (0.961). In interaction of media and dose media MS and dose 3 mg/L BAP (2.490) showed higher significant difference among other interaction of media and doses followed by media MS and dose 4 mg/ L BAP (2.085).

Table 3: Number of shoots explants^{-1} of *Aloe vera* in 1st and 2nd experiments. (Week III)

Treatments	Number of shoots explants^{-1} (Experiment-1st)					Number of shoots explants^{-1} (Experiment-2nd)				
	Shoot tip (ST)	Nodal cutting (NC)		Mean		Shoot tip (ST)	Nodal cutting (NC)		Mean	
M_1xD_1	1.199	1.785		1.492		1.299	1.862		1.580	
M_1xD_2	1.276	1.976		1.626		1.36	2.009		1.686	
M_1xD_3	2.014	2.965		2.489		2.106	3.190		2.649	
M_1xD_4	1.596	2.575		2.085		1.618	3.007		2.312	
M_1xD_5	1.595	2.608		2.102		1.536	2.589		2.062	
M_2xD_1	0.582	0.813		0.697		0.606	0.854		0.730	
M_2xD_2	0.723	0.886		0.804		0.742	0.884		0.813	
M_2xD_3	1.207	1.878		1.542		1.259	1.872		1.565	
M_2xD_4	1.138	1.206		1.172		1.193	1.305		1.249	
M_2xD_5	0.995	1.054		1.024		1.010	1.140		1.075	
Mean	1.232	1.774		1.503		1.273	1.871		1.572	
	M_1 (MS)	M_2 (B_5)	Mean	ST	NC	M_1 (MS)	M_2 (B_5)	Mean	ST	NC
D_1 (1 mg/l BAP)	1.492	0.697	1.095	0.890	1.299	1.580	0.730	1.155	0.953	1.358
D_2 (2 mg/l BAP)	1.626	0.804	1.215	0.999	1.431	1.686	0.813	1.250	1.052	1.447
D_3 (3 mg/l BAP)	2.489	1.542	2.0160	1.610	2.422	2.648	1.565	2.107	1.682	2.531
D_4 (4 mg/l BAP)	2.085	1.172	1.629	1.367	1.890	2.312	1.249	1.781	1.405	2.156
D_5 (5 mg/l BAP)	2.101	1.024	1.563	1.295	1.831	2.062	1.075	1.569	1.273	1.865
Mean	1.959	1.048	1.503	1.232	1.774	2.058	1.087	1.572	1.273	1.871
	ST	NC		Mean		ST	NC		Mean	
Media (M_1)	1.536	2.382		1.959		1.584	2.531		2.058	
Media (M_2)	0.929	1.167		1.048		0.962	1.211		1.087	
Mean	1.232	1.774		1.503		1.273	1.871		1.572	
	S.E. (diff)	C.D. (0.05)				S.E. (diff.)	C.D. (0.05)			
Media (M)	0.0040	0.0084				0.0041	0.0085			
Dose (D)	0.0101	0.0211				0.0102	0.0214			
Explants(E)	0.0040	0.0084				0.0041	0.0085			
M x D	0.0202	0.0421				0.0205	0.0427			
D x E	0.0081	0.0169				0.0082	0.0171			
M x E	0.0081	0.0169				0.0082	0.0171			
M x E x D	0.0404	0.0843				0.0409	0.0854			

Media B_5 and dose 1 mg/L BAP (0.697) was recorded lower no. of shoots explants^{-1} in *Aloe vera*. In interaction explants and doses, explants nodal cutting and dose 3 mg/L BAP were recorded higher no. of shoots explants^{-1} *Aloe vera* i.e. (2.421) followed by explants nodal cutting and dose 4 mg/L BAP showed no shoots explants^{-1} (1.890). In interaction level of explants and media, explants nodal cutting and media MS were recorded higher no of shoots explants^{-1} in *Aloe vera* (2.381) followed by explants shoots and media MS i.e. (1.536). Minimum no of shoot explants^{-1} were found to be in explant shoot tip and media B_5 (0.929).

Number of shoots explants^{-1} at 4th week

Data pertaining to in this table 4 number of shoots explants^{-1} of *Aloe vera* in 4th week of 1st experiment shows significant differences among explants both shoot tip (ST) and nodal cutting (NC), media MS and B_5 at different doses of BAP (*Banzyle amino purine*). Explants at nodal cutting (2.861)

showed higher no. of shoots in *Aloe vera* significant difference to shoot tip (1.942). Media MS exhibit higher no. of shoots in media i.e. (3.111) of *Aloe vera* showed significant difference to media B_5 (1.693). Does 3 mg/L BAP (*Banzyle amino purine*) were showed higher no. of shoot given in significant difference (3.226) followed by dose 4 mg/L BAP (2.631) among other doses were recorded higher no. of shoots explants^{-1} in *Aloe vera*.

In interaction of media and dose media MS and dose 3 mg/L BAP (3.942) showed higher significant difference among other interaction of media and doses followed by media MS and dose 4 mg/ L BAP (3.414). Media B_5 and dose 1 mg/L BAP (1.194) was recorded lower no. of shoots explants^{-1} in *Aloe vera*. In interaction explants and doses, explants nodal cutting and dose 3 mg/L BAP were recorded higher no. of shoots explants^{-1} *Aloe vera* i.e. (4.000) followed by explants nodal cutting and dose 4 mg/L BAP showed no. shoots explants^{-1} (3.065). In interaction level of explants and media, explants nodal cutting and media MS were recorded higher no. of shoots explants^{-1} in *Aloe vera* (3.880) followed by explants shoots and media MS i.e. (2.342). Minimum no of shoot explants^{-1} were found to be in explant shoot tip and media B_5 (1.543).

Observation with respect to in the table 4 number of shoots explants^{-1} of *Aloe vera* in 4rd week of 2nd experiment shows significant differences among explants both shoot tip (ST) and nodal cutting (NC), media MS and B_5 at different doses of BAP (*Banzyle amino purine*). Explants at nodal cutting (2.986) showed higher no. of shoots in *Aloe vera* given significant difference to shoot tip (2.007). Media MS exhibit higher no. of shoots in media i.e. (3.223) of *Aloe vera* showed significant difference to media B_5 (1.770). Does 3 mg/L BAP (*Banzyle amino purine*) were showed higher no. of shoot given in significant difference (3.4012) followed by dose 4 mg/L BAP (2.766) among other doses were recorded higher no. of shoots explants^{-1} in *Aloe vera*.

In interaction of media and dose media MS and dose 3 mg/L BAP (4.162) showed higher significant difference among other interaction of media and doses followed by media MS and dose 4 mg/ L BAP (3.591). Media B_5 and dose 1 mg/L BAP (1.155) was recorded lower no. of shoots explants^{-1} in *Aloe vera*. In interaction explants and doses, explants nodal.

Table 4: Number of shoots explants^{-1} of *Aloe vera* in 1st and 2nd experiments. (Week IV)

Treatments	Number of shoots explants^{-1} (Experiment-1st)					Number of shoots explants^{-1} (Experiment-2nd)				
	Shoot tip (ST)	Nodal cutting (NC)		Mean		Shoot tip (ST)	Nodal cutting (NC)		Mean	
M_1xD_1	1.813	2.787		2.300		1.964	2.981		2.472	
M_1xD_2	2.00	3.212		2.607		2.039	3.200		2.620	
M_1xD_3	2.915	4.969		3.942		3.102	5.223		4.162	
M_1xD_4	2.597	4.232		3.414		2.455	4.728		3.592	
M_1xD_5	2.386	4.203		3.294		2.373	4.167		3.270	
M_2xD_1	1.139	1.249		1.194		1.044	1.266		1.155	
M_2xD_2	1.200	1.424		1.311		1.289	1.452		1.370	
M_2xD_3	1.990	3.032		2.511		2.150	3.129		2.640	
M_2xD_4	1.798	1.898		1.848		1.968	1.916		1.942	
M_2xD_5	1.591	1.612		1.601		1.687	1.800		1.744	
Mean	1.943	2.862		2.402		2.007	2.986		2.497	
	M_1 (MS)	M_2 (B_5)	Mean	ST	NC	M_1 (MS)	M_2 (B_5)	Mean	ST	NC
D_1 (1 mg/l BAP)	2.300	1.194	1.747	1.476	2.018	2.472	1.155	1.814	1.503	2.124
D_2 (2 mg/l BAP)	2.607	1.311	1.959	1.601	2.318	2.620	1.370	1.995	1.664	2.326
D_3 (3 mg/l BAP)	3.942	2.511	3.226	2.452	4.001	4.162	2.640	3.401	2.626	4.176
D_4 (4 mg/l BAP)	3.414	1.848	2.631	2.197	3.065	3.592	1.942	2.767	2.211	3.322
D_5 (5 mg/l BAP)	3.294	1.601	2.448	1.988	2.907	3.270	1.744	2.507	2.030	2.983
Mean	3.111	1.693	2.402	1.943	2.861	3.223	1.770	2.497	2.007	2.986
	ST	NC		Mean		ST	NC		Mean	
Media (M_1)	2.342	3.880		3.111		2.387	4.060		3.223	
Media (M_2)	1.543	1.843		1.693		1.628	1.913		1.770	
Mean	1.943	2.862		2.402		2.007	2.986		2.497	
	S.E. (diff)	C.D. (0.05)				S.E. (diff.)	C.D. (0.05)			
Media (M)	0.0050	0.0104				0.0053	0.0112			
Dose (D)	0.0125	0.0260				0.0134	0.0279			
Explants(E)	0.0050	0.0104				0.0053	0.0112			
M x D	0.0249	0.0520				0.0267	0.0558			
D x E	0.0100	0.0208				0.0107	0.0223			
M x E	0.0100	0.0208				0.0107	0.0223			
M x E x D	0.0499	0.1040				0.0535	0.1116			

cutting and doses 3 mg/L BAP were recorded higher no. of shoots explants^{-1} *Aloe vera* i.e. (4.176) followed by explants nodal cutting and dose 4 mg/L BAP showed no shoots explants^{-1} (3.322).In interaction level of explants and media, explants nodal cutting and media MS were recorded higher no of shoots explants^{-1} in *Aloe vera* (4.060) followed by explants shoots and media MS i.e. (2.386). Minimum no of shoot explants^{-1} were found to be in explant shoot tip and media B_5 (1.627).

In both experiments, explants, media and doses showed significant response, explants nodal cutting, media MS and doses 3 mg/L BAP given best response to increase higher number of shoots in *Aloe vera* and interactions were also recorded significant response at 5.0% level of significance.

Number of shoots explants^{-1} at 5th week

Data pertaining to in the table 5 number of shoots explants^{-1} of *Aloe vera* in 5th week of 1st experiment shows significant

differences among explants both shoot tip (ST) and nodal cutting (NC), media MS and B_5 at different doses of BAP (*Banzyle amino purine*). Explants at nodal cutting (4.594) showed higher no. of shoots in *Aloe vera* significant difference to shoot tip (3.399). Media MS exhibit higher no. of shoots in media i.e. (5.346) of *Aloe vera* showed significant difference to media B_5 (2.648). Does 3 mg/L BAP (*Banzyle amino purine*) were showed higher no. of shoot given in significant difference (5.121) followed by dose 4 mg/L BAP (4.467) among other doses were recorded higher no. of shoots explants^{-1} in *Aloe vera*.

In interaction of media and dose media MS and dose 3 mg/L BAP (6.688) showed higher significant difference among other interaction of media and doses followed by media MS and dose 4 mg/ L BAP (6.005). Media B_5 and dose 1 mg/L BAP (1.896) was recorded lower no. of shoots explants^{-1} in *Aloe vera*. In interaction explants and doses, explants nodal cutting and dose 3 mg/L BAP were recorded higher no. of shoots explants^{-1} *Aloe vera* i.e. (5.968) followed by explants nodal cutting and dose 4 mg/L BAP showed no. shoots explants^{-1} (5.073). In interaction level of explants and media, explants nodal cutting and media MS were recorded higher no. of shoots explants^{-1} in *Aloe vera* (6.394) followed by explants shoots and media MS i.e. (4.297). Minimum no of shoot explants^{-1} were found to be in explant shoot tip and media B_5 (2.502).

Observation with respect to in the table 5 number of shoots explants^{-1} of *Aloe vera* in 5th week of 2nd experiment shows significant differences among explants both shoot tip (ST) and nodal cutting (NC), media MS and B_5 at different doses of BAP (*Banzyle amino purine*). Explants at nodal cutting (4.905) showed higher no. of shoots in *Aloe vera* given significant difference to shoot tip (3.326). Media MS exhibit higher no. of shoots in media i.e. (5.340) of *Aloe vera* showed significant difference to media B_5 (2.891). Does 3 mg/L BAP (*Banzyle amino purine*) were showed higher no. of shoot given in significant difference (5.688) followed by dose 4 mg/L BAP (4.558) among other doses were recorded higher no. of shoots explants^{-1} in *Aloe vera*.

Table 5: Number of shoots explants^{-1} of *Aloe vera* in 1st and 2nd experiments. (Week V)

Treatments	Number of shoots explants^{-1} (Experiment-1st)					Number of shoots explants^{-1} (Experiment-2nd)				
	Shoot tip (ST)	Nodal cutting (NC)		Mean		Shoot tip (ST)	Nodal cutting (NC)		Mean	
M_1xD_1	3.210	4.410		3.810		3.181	4.753		3.967	
M_1xD_2	3.784	5.254		4.519		3.461	5.243		4.352	
M_1xD_3	5.248	8.128		6.688		5.239	8.766		7.002	
M_1xD_4	4.817	7.180		5.999		4.168	7.722		5.945	
M_1xD_5	4.426	7.002		5.7141		4.044	6.827		5.435	
M_2xD_1	1.817	1.976		1.897		1.666	2.040		1.853	
M_2xD_2	1.916	2.419		2.167		2.083	2.396		2.240	
M_2xD_3	3.301	3.809		3.555		3.526	5.221		4.373	
M_2xD_4	2.907	2.967		2.936		3.224	3.118		3.171	
M_2xD_5	2.572	2.796		2.684		2.672	2.965		2.819	
Mean	3.400	4.594		3.997		3.327	4.905		4.116	
	M_1 (MS)	M_2 (B_5)	Mean	ST	NC	M_1 (MS)	M_2 (B_5)	Mean	ST	NC
D_1 (1 mg/l BAP)	3.810	1.897	2.853	2.513	3.193	3.967	1.853	2.910	2.424	3.396
D_2 (2 mg/l BAP)	4.519	2.167	3.343	2.850	3.837	4.352	2.240	3.296	2.772	3.820
D_3 (3 mg/l BAP)	6.688	3.555	5.121	4.274	5.969	7.002	4.373	5.688	4.383	6.993
D_4 (4 mg/l BAP)	5.998	2.936	4.467	3.862	5.073	5.945	3.171	4.558	3.697	5.420
D_5 (5 mg/l BAP)	5.714	2.684	4.199	3.499	4.899	5.436	2.819	4.127	3.358	4.896
Mean	5.346	2.648	3.997	3.400	4.594	5.341	2.891	4.116	3.327	4.905
	ST	NC		Mean		ST	NC		Mean	
Media (M_1)	4.297	6.395		5.346		4.0189	6.662		5.341	
Media (M_2)	2.502	2.793		2.648		2.634	3.148		2.891	
Mean	3.400	4.594		3.997		3.327	4.905		4.116	
	S.E. (diff)	C.D. (0.05)				S.E. (diff.)	C.D. (0.05)			
Media (M)	0.0085	0.0178				0.0114	0.0239			
Dose (D)	0.0213	0.0445				0.0286	0.0597			
Explants(E)	0.0085	0.0178				0.0114	0.0239			
M x D	0.0426	0.0889				0.0572	0.1194			
D x E	0.0171	0.0356				0.0229	0.0478			
M x E	0.0171	0.0356				0.0229	0.0478			
M x E x D	0.0853	0.1779				0.1145	0.2388			

In interaction of media and dose media MS and dose 3 mg/L BAP (7.002) showed higher significant difference among other interaction of media and doses followed by media MS and dose 4 mg/ L BAP (5.945). Media B_5 and dose 1 mg/L BAP (1.853) was recorded lower no. of shoots explants^{-1} in *Aloe vera*. In interaction explants and doses, explants nodal cutting and doses 3 mg/L BAP were recorded higher no. of shoots explants^{-1} *Aloe vera* i.e. (6.993) followed by explants nodal cutting and dose 4 mg/L BAP showed no shoots explants^{-1} (5.419). In interaction level of explants and media, explants nodal cutting and media MS were recorded higher no of shoots explants^{-1} in *Aloe vera* (6.662) followed by explants shoots and media MS i.e. (4.018). Minimum no of shoot explants^{-1} were found to be in explant shoot tip and media B_5 (2.634). In both experiments, explants, media and doses showed significant response, explants nodal cutting, media MS and doses 3 mg/L BAP given best response to increase higher number of shoots in *Aloe vera* and interactions were also recorded significant response at 5.0% level of significance.

Number of shoots explants^{-1} at 6th week

Data pertaining to in the table 6 number of shoots explants^{-1} of *Aloe vera* in 6th week of 1st experiment show experiment shows significant differences among explants both shoot tip (ST) and nodal cutting (NC), media MS and B_5 at different doses of BAP (*Banzyle amino purine*). Explants at nodal cutting (7.320) showed higher number of shoots in *Aloe vera* significant difference to shoot tip (6.251). Media MS exhibit higher no. of shoots in media i.e. (8.866) of *Aloe vera* showed significant difference to media B_5 (4.705). Does 3 mg/L BAP (*Banzyle amino purine*) were showed higher no. of shoot given in significant difference (8.780) followed by dose 4 mg/L BAP (7.617) among other doses were recorded higher no. of shoots explants^{-1} in *Aloe vera*.

In interaction of media and dose media MS and dose 3 mg/L BAP (11.180) showed higher significant difference among other interaction of media and doses followed by media MS and dose 4 mg/ L BAP (10.042). Media B_5 and dose 1 mg/L BAP (3.308) was recorded lower no. of shoots explants^{-1} in *Aloe vera*. In interaction explants and doses, explants nodal cutting and dose 3 mg/L BAP were recorded higher no. of shoots explants^{-1} *Aloe vera* i.e. (9.682) followed by explants nodal cutting and dose 4 mg/L BAP showed no. shoots explants^{-1} (8.243). In interaction level of explants and media, explants nodal cutting and media MS were recorded higher no. of shoots explants^{-1} in *Aloe vera* (9.743) followed by explants shoots and media MS i.e. (7.989). Minimum no of shoot explants^{-1} were found to be in explant shoot tip and media B_5 (4.514).

Observation with respect to in the table 6 number of shoots explants^{-1} of *Aloe vera* in 6th week of 2nd experiment shows non-significant differences among number of shoot per explants of both shoot tip (ST) and nodal cutting (NC) of *Aloe vera*. Media MS and B_5 at different doses of BAP (*Banzyle amino purine*) were recorded significant difference. Explants at nodal cutting (6.026) showed lower no. of shoots in *Aloe vera* given non-significant difference to shoot tip (6.047). Media MS exhibit higher no. of shoots in media i.e. (6.993) of *Aloe vera* showed significant difference to media B_5 (5.080). Does 3 mg/L BAP (*Banzyle amino purine*) were showed higher no. of shoot given in significant difference (8.431).

Table 6: Number of shoots explants^{-1} of *Aloe vera* in 1st and 2nd experiments. (Week VI)

Treatments	Number of shoots explants^{-1} (Experiment-1st)					Number of shoots explants^{-1} (Experiment-2nd)				
	Shoot tip (ST)	Nodal cutting (NC)		Mean		Shoot tip (ST)	Nodal cutting (NC)		Mean	
M_1xD_1	5.594	6.454		6.024		5.554	4.799		5.176	
M_1xD_2	7.391	7.441		7.416		6.432	5.233		5.832	
M_1xD_3	9.741	12.619		11.180		9.719	8.558		9.139	
M_1xD_4	8.775	11.309		10.042		7.782	7.732		7.757	
M_1xD_5	8.444	10.894		9.669		7.322	6.800		7.061	
M_2xD_1	3.237	3.380		3.308		3.001	3.453		3.227	
M_2xD_2	3.360	4.235		3.797		3.699	4.336		4.017	
M_2xD_3	6.015	6.746		6.380		6.444	9.004		7.724	
M_2xD_4	5.207	5.178		5.193		5.797	5.321		5.559	
M_2xD_5	4.750	4.946		4.848		4.726	5.023		4.875	
Mean	6.252	7.320		6.786		6.048	6.0261		6.037	
	M_1 (MS)	M_2 (B_5)	Mean	ST	NC	M_1 (MS)	M_2 (B_5)	Mean	ST	NC
D_1 (1 mg/l BAP)	6.024	3.308	4.666	4.416	4.917	5.176	3.227	4.202	4.278	4.126
D_2 (2 mg/l BAP)	7.416	3.797	5.606	5.375	5.838	5.832	4.0177	4.925	5.065	4.785
D_3 (3 mg/l BAP)	11.180	6.380	8.780	7.878	9.682	9.139	7.724	8.431	8.081	8.781
D_4 (4 mg/l BAP)	10.042	5.192	7.617	6.992	8.243	7.757	5.559	6.658	6.790	6.526
D_5 (5 mg/l BAP)	9.669	4.848	7.259	6.597	7.920	7.061	4.875	5.968	6.024	5.912
Mean	8.866	4.705	6.786	6.252	7.320	6.993	5.081	6.037	6.0477	6.026
	ST	NC		Mean		ST	NC		Mean	
Media (M_1)	7.989	9.743		8.866		7.362	6.624		6.993	
Media (M_2)	4.514	4.897		4.705		4.733	5.428		5.081	
Mean	6.251	7.320		6.786		6.047	6.0261		6.037	
	S.E. (diff)	C.D. (0.05)				S.E. (diff.)	C.D. (0.05)			
Media (M)	0.0143	0.0299				0.0153	0.0320			
Dose (D)	0.0358	0.0748				0.0383	0.0799			
Explants(E)	0.0143	0.0299				0.0153	NS			
M x D	0.0717	0.1495				0.0766	0.1598			
D x E	0.0287	0.0598				0.0306	0.0639			
M x E	0.0287	0.0598				0.0306	0.0639			
M x E x D	0.1434	0.2991				0.1532	0.3196			

Followed by dose 4 mg/L BAP (6.658) among other doses were recorded higher no. of shoots explants^{-1} in *Aloe vera*.

In interaction of media and dose media MS and dose 3 mg/L BAP (9.138) showed higher significant difference among other interaction of media and doses followed by media MS and dose 4 mg/ L BAP (7.757). Media B_5 and dose 1 mg/L BAP (3.227) was recorded lower no. of shoots explants^{-1} in *Aloe vera*. In interaction explants and doses, explants nodal cutting and doses 3 mg/L BAP were recorded higher no. of shoots explants^{-1} *Aloe vera* i.e. (8.781) followed by explants nodal cutting and dose 4 mg/L BAP showed no shoots explants^{-1} (6.526). In interaction level of explants and media, explants shoot tip and media MS were recorded higher no of shoots explants^{-1} in *Aloe vera* (7.361) followed by explants nodal cutting and media MS i.e. (6.624). Minimum no of shoot explants^{-1} were found to be in explant shoot tip and media B_5 (4.733). Number of shoots explants in *Aloe vera* of both experiments in 6th week were recorded that ST and NC

plant showed significant difference at first experiment and in second trial it showed that non-significant difference at 5 percent (5%). Media MS and B_5 were recorded in both experiment showed significant difference and MS was superior enhancing the number of shoots explants in *Aloe vera*. Does 3 mg/L BAP was recorded in both experiment, superior statistically followed by 4 mg/L BAP enhancing the number of shoots explants in *Aloe vera*.

Tissue culture is the cultivation of the plant cells, tissue and organs on specially formulated nutrients media. Number of shoots explants^{-1} of *Aloe vera* in 1st week reveal that (Figure1&2) significant difference varied among explants both shoots tip and nodal cutting. Media and different doses of BAP explants nodal cutting showed significant highest and MS media took significantly maximum number of shoots seems to be in dose 3 mg/l BAP among other doses. During both experiments a similar finding was also corroborated by (Eufrocinio and Malasa 2005) [22] in A. *barbadensis* reported best multiple shoot bud induction at medium containing BAP.

Effect of plant growth regulators on shoot proliferation explants in *Aloe vera* at 1st week interaction effect of explants and media, media and doses showed significant effect over number of shoots in *Aloe vera*. Interaction between explants and media was showed non-significant in first trial. Interaction effect it has been presented in result earlier during both experiments.

Tissue culture is the cultivation of the plant cells, tissue and organs on specially formulated nutrients media. Number of shoots explants^{-1} of *Aloe vera* in 2nd week reveal that (Figure 3 & 4) significant difference varied among explants both shoots tip and nodal cutting. Media and different doses of BAP explants nodal cutting showed significant highest and MS media took significantly maximum number of shoots seems to be in dose 3 mg/l BAP among other doses.

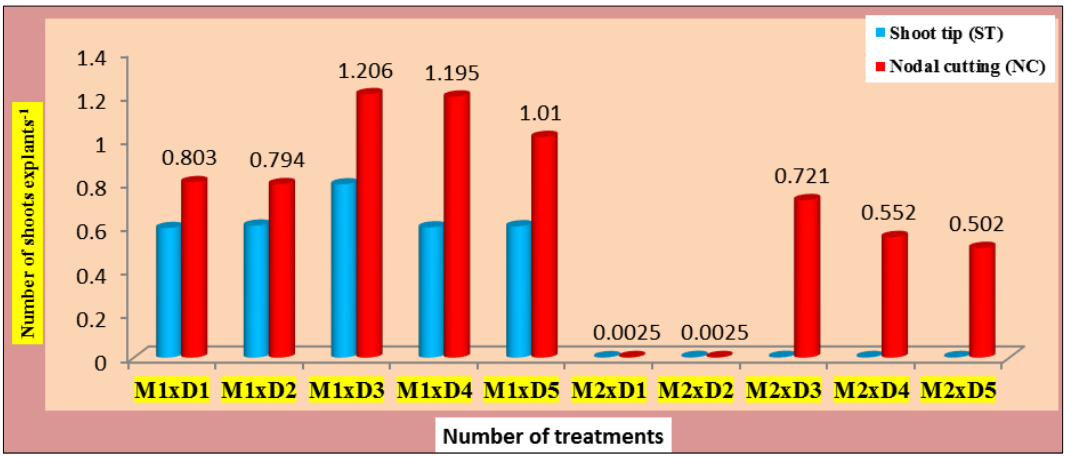
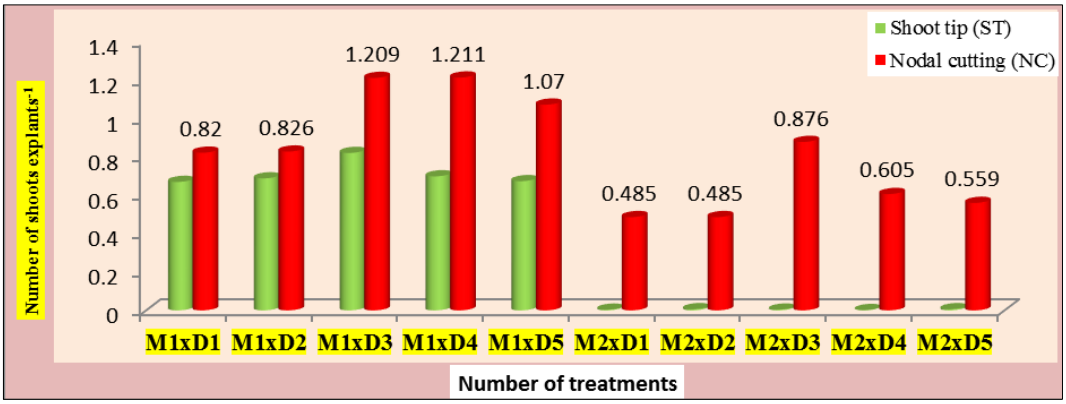


Fig 1: Number of shoots explants^{-1} of *Aloe vera* at 1st week of 1st experiments



M1	MS media	D1	1 mg/L BAP
M2	B5 media	D2	2 mg/L BAP
D	Doses	D3	3 mg/L BAP
		D4	4 mg/L BAP
		D5	5 mg/L BAP

Fig 2: Number of shoots explants^{-1} of *Aloe vera* at 1st week of 2nd experiment

Effect of plant growth regulators on shoot proliferation explants in *Aloe vera* at 2nd week interaction effect of explants and media, media and doses showed significant effect over number of shoots in *Aloe vera*. Interaction between explants and doses was also showed significant. Interaction effect it has been presented in result earlier during both experiments.

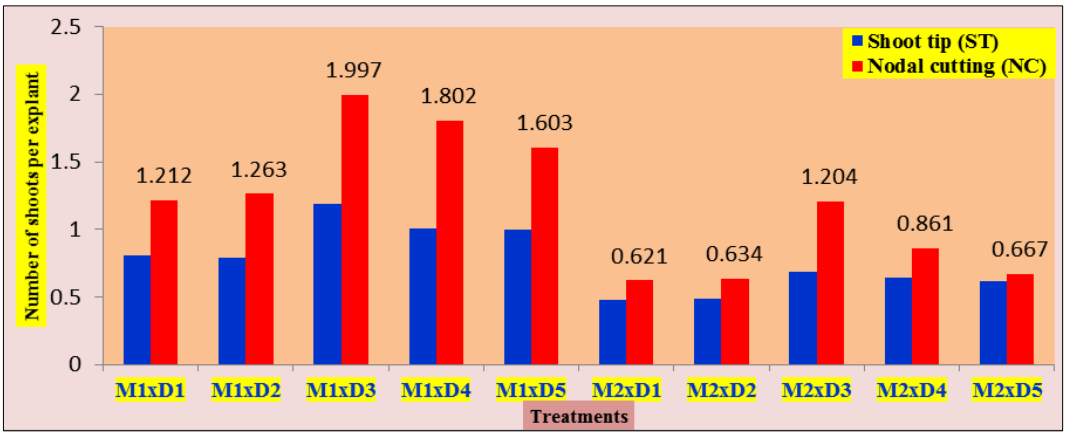
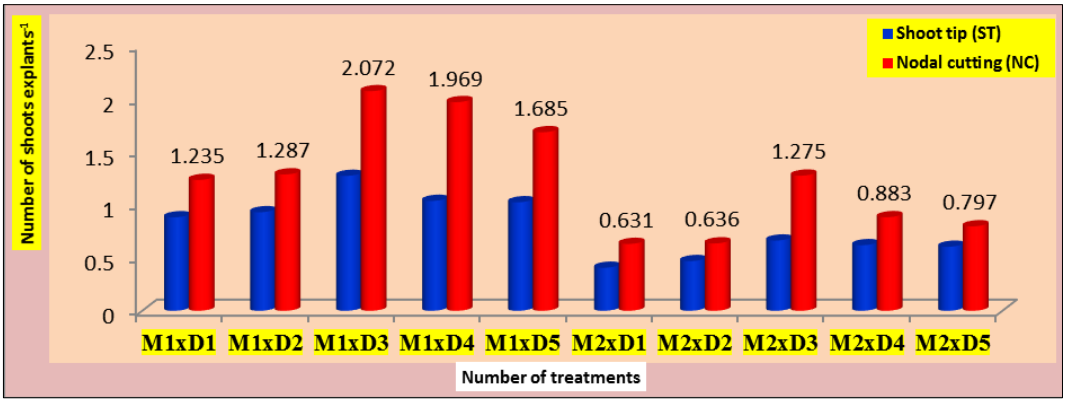


Fig 3: Number of shoots explants^{-1} of *Aloe vera* at 2ndWeek in 1st experiment



M1	MS media	D1	1 mg/L BAP
M2	B5 media	D2	2 mg/L BAP
D	Doses	D3	3 mg/L BAP
		D4	4 mg/L BAP
		D5	5 mg/L BAP

Fig 4: Number of shoots explants^{-1} of *Aloe vera* at 2nd Week in 2nd experiment

Demand of *Aloe vera* has increased many fold in result past due to its highly priced cosmetic and medicinal properties. Number of shoots explants^{-1} of *Aloe vera* in 3rd week reveal that (Figure 5&6) significant difference varied among explants both shoots tip and nodal cutting. Media and different doses of BAP explants nodal cutting showed significant highest and MS media took significantly maximum number of shoots seems to be in dose 3 mg/l BAP among other doses. During both experiments a similar finding was also corroborated by (Baksha *et al*. 2005) [3].

Effect of plant growth regulators on shoot proliferation explants in *Aloe vera* at 3rd at week interaction effect of explants and media, media and doses showed significant effect over number of shoots in *Aloe vera*. Interaction between explants and doses was also showed significant.

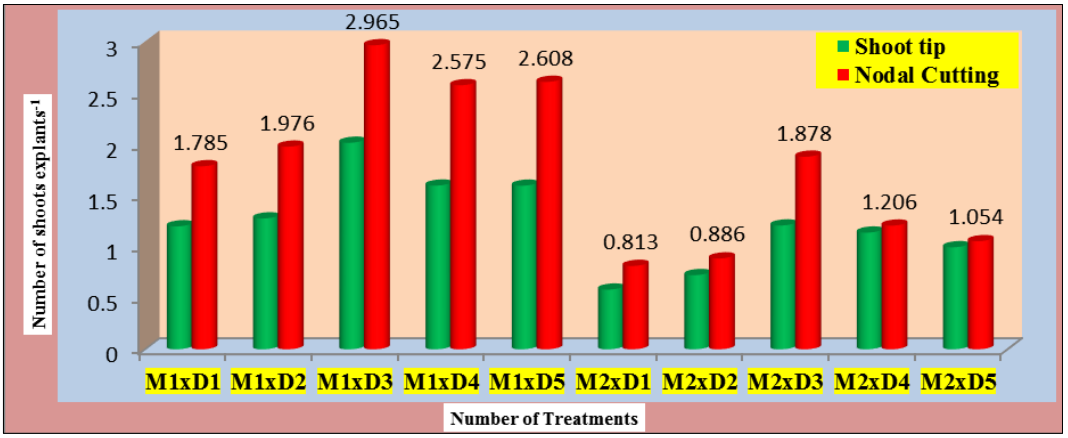
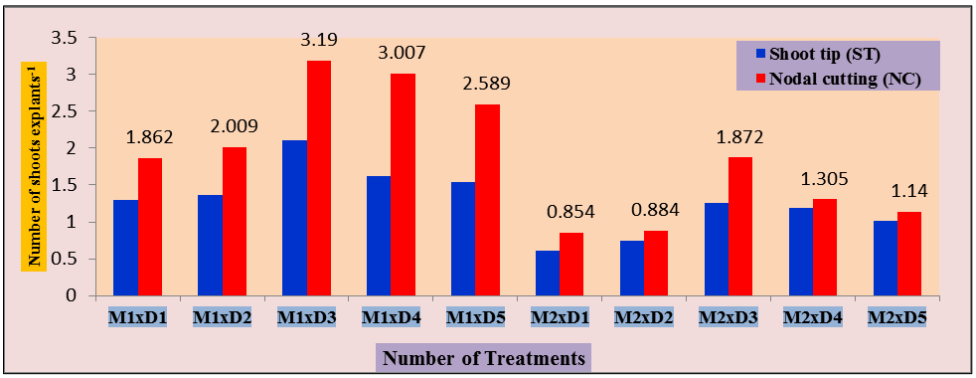


Fig 5: Number of shoots explants^{-1} of *Aloe vera* at 3rd Week in 1st experiment



M1	MS media	D1	1 mg/L BAP
M2	B5 media	D2	2 mg/L BAP
D	Doses	D3	3 mg/L BAP
		D4	4 mg/L BAP
		D5	5 mg/L BAP

Fig 6: Number of shoots explants^{-1} of *Aloe vera* at 3rd week of 2nd Experiment

Higher order interaction effect among explants, media and doses showed also significant effect in explants of *Aloe vera* plant. Interaction effect it has been presented in result earlier during both experiments.

Data pertaining to number of shoot explants^{-1} of *Aloe vera* at 4th week in both experiments reveal that (Figure 5 & 6) significant difference varied among explants both shoots tip and nodal cutting. Media and different doses of BAP explants nodal cutting showed significant highest and MS media took significantly maximum number of shoots seems to be in dose 3 mg/l BAP among other doses. (Molasaghi *et al*. 2014) reported highest rate of multiplication in *Aloe vera* while inoculated in MS supplemented with 1.0 mg/l IAA and 4.0 mg/l BAP as well as 0.2 mg/l IAA and 0.8 mg/l BAP. (Chowhan 2017) [8] used IBA instead of IAA along with BAP and found it effective in inducing maximum shoot proliferation in *Aloe vera*.

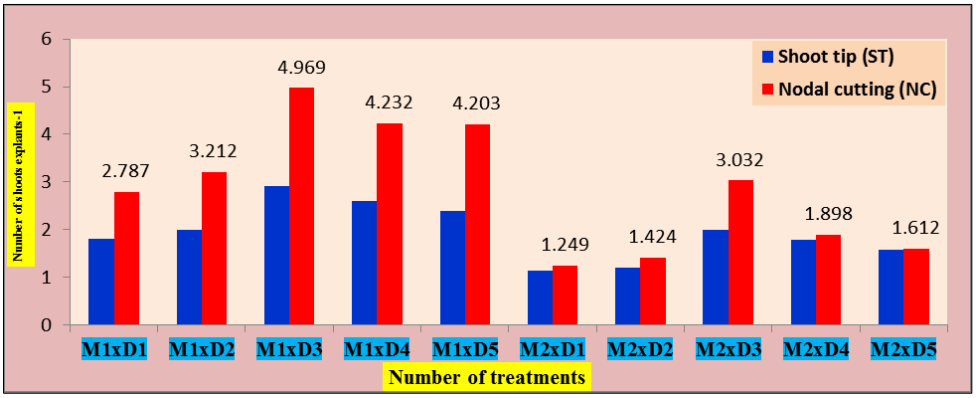
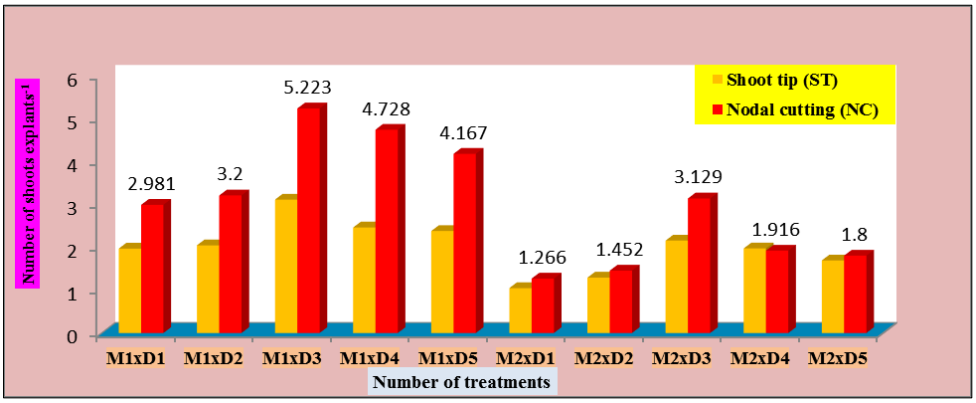


Fig 7: Number of shoots explants^{-1} of *Aloe vera* at 4th week of 1stexperiment



M1	MS media	D1	1 mg/L BAP
M2	B5 media	D2	2 mg/L BAP
D	Doses	D3	3 mg/L BAP
		D4	4 mg/L BAP
		D5	5 mg/L BAP

Fig 8: Number of shoots explants^{-1} of *Aloe vera* at 4th and of 2nd experiment

Effect of plant growth regulators on shoot proliferation explants in *Aloe vera* at 4th at week interaction effect of explants and media, media and doses showed significant effect over number of shoots in *Aloe vera*. Interaction between explants and doses was also showed significant. Higher order interaction effect among explants, media and doses showed also significant effect in explants of *Aloe vera* plant. Interaction effect it has been presented in result earlier during both experiments.

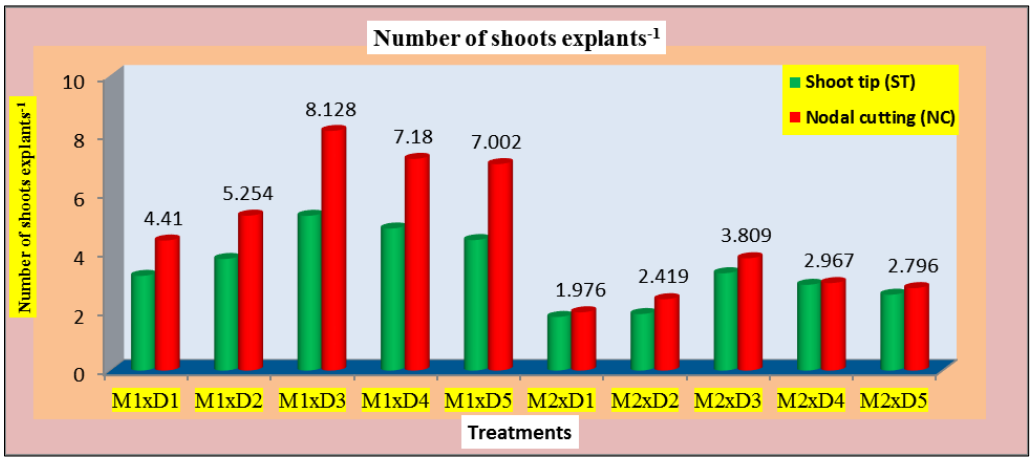
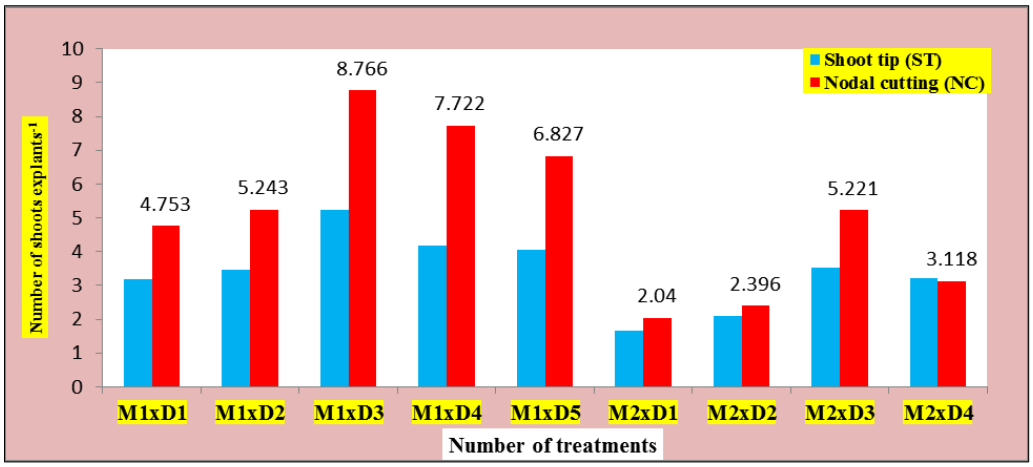


Fig 9: Number of shoots explants-1 of *Aloe vera* at 5th Week 1st experiment



M1	MS media	D1	1 mg/L BAP
M2	B5 media	D2	2 mg/L BAP
D	Doses	D3	3 mg/L BAP
		D4	4 mg/L BAP
		D5	5 mg/L BAP

Fig 10: Number of shoots explants-1 of *Aloe vera* at 5th Week of 2nd experiment

Number of shoots explants-1 of *Aloe vera* in 5th week reveal that (Figure 9&10) significant difference varied among explants both shoots tip and nodal cutting. Media and different doses of BAP explants nodal cutting showed significant highest and MS media took significantly maximum number of shoots seems to be in dose 3 mg/l BAP among other doses. During both experiments a similar finding was also corroborated by (Chandra Sekhar Singh B. *et al.* 2017) [6].

Effect of plant growth regulators on shoot multiplication explants in *Aloe vera* at 5th at week interaction effect of explants and media, media and doses showed significant effect over number of shoots in *Aloe vera*. Interaction between explants and doses was also showed significant. Interaction effect it has been presented in result earlier during both experiments.

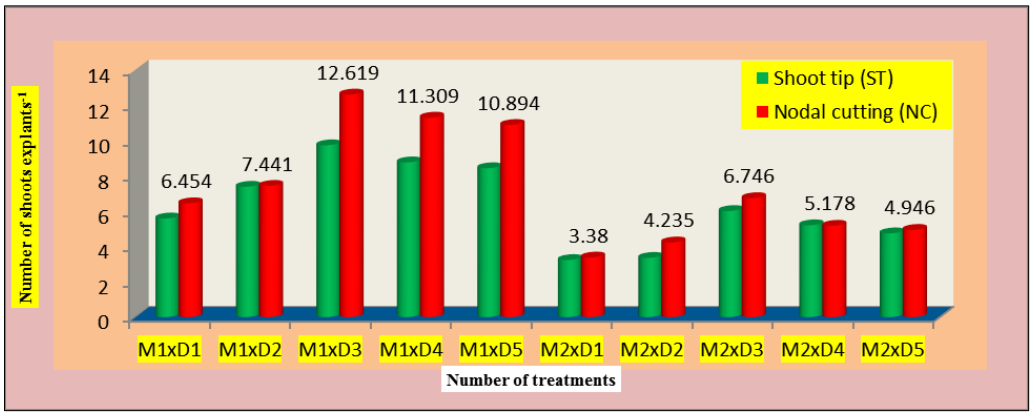
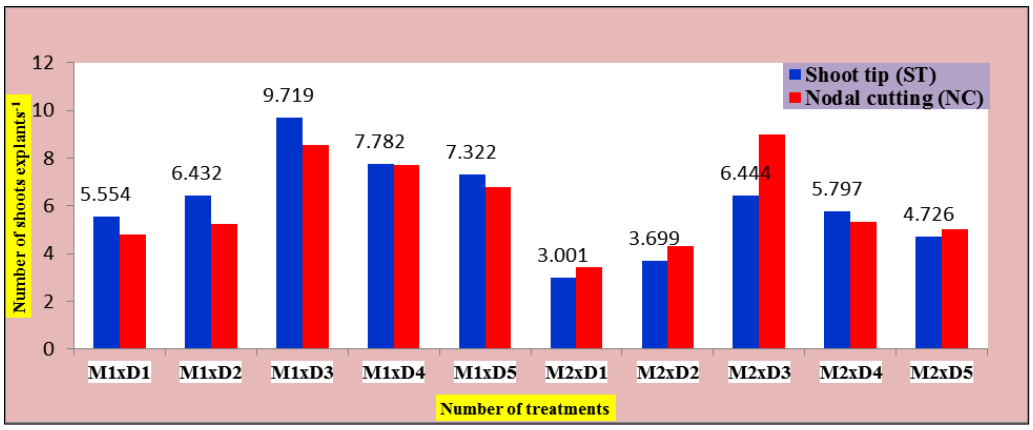


Fig 11: Number of shoots explants^{-1} of *Aloe vera* at 6th Week 1st experiment



M1	MS media	D1	1 mg/L BAP
M2	B5 media	D2	2 mg/L BAP
D	Doses	D3	3 mg/L BAP
		D4	4 mg/L BAP
		D5	5 mg/L BAP

Fig 12: Number of shoots explants^{-1} of *Aloe vera* at 6th Week 2nd experiment

Number of shoots explants^{-1} in *Aloe vera* of both experiments in 6th week were recorded that ST and NC plant showed significant (Figure 11&12) difference at first experiment and in second trial it was showed that non-significant difference. Media and different doses of BAP explants nodal cutting showed significant highest and MS media took significantly maximum number of shoots seems to be in dose 3 mg/l BAP among other doses. During both experiments a similar finding was also corroborated by (The presence of the plant growth regulators, particularly cytokinin in the culture medium, is the most important factors for shoot proliferation (Abrie & Staden, 2001; Aggarwal & Barna, 2004; Chaudhuri & Mukundan, 2001; Hoque, 2010; Liao *et al*., 2004; Mamidala & Nanna, 2009) [1, 2, 13, 16, 17].

Effect of plant growth regulators on shoot multiplication explants in *Aloe vera* at 6th at week interaction effect of explants and media, media and doses showed significant effect over number of shoots in *Aloe vera*. Interaction between explants and doses was also showed significant. Higher order interaction effect among explants, media and doses showed also significant effect in explants of *Aloe vera* plant. Interaction effect it has been presented in result earlier during both experiments.

Conclusion

Explant nodal cutting (NC) as compare to shoot tip (ST) was found most suitable and increased the shooting parameters of *Aloe vera*. MS medium supplemented with doses of 3 mg /L BAP given best response for shooting as compare to B_5 media of *Aloe vera*.

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