International Journal of Advances in Engineering and Management (IJAEM)
Volume 2, Issue 7, pp: 173-176 www.ijaem.net ISSN: 2395-5252

Gamma Irradiation in Stem Node Explant of Cucurbita Maxima.

Mandaloju Venkateshwarlu
Department of Botany, Kakatiya University, Warangal – 506 009. Telangana, India.

Date of Submission: 20-09-2020 Date of Acceptance: 02-10-2020

ABSTRACT: In irradiated stem node explants cultures the maximum number of shoots were observed in 2kR, 4, 6, 10, 15kR. The number of shoots decreased with increasing doses of irradiation. At higher doses of 4 and 2kR, light green compact callus was formed in all most all the explants. The effect of lower doses of gamma irradiation on shoot bud formation and rooting efficiency from stem node explants cultured on MS+2.0 mg/l L-glutamic acid + 0.5 mg/l BAP, simulation of shoot and root induction were studied of growth in the callus at lower doses. At higher doses like 10 and 15 kR growth was drastically reduced. On the whole gamma rays definitely influenced the induction of callus and regeneration. Effect of gamma irradiation on growth and differentiation of another callus in Datura was reported (Jain et. al, 1984). Kocha and Spiegel-Roy (1978Callus treatment in Citrilus Venakteshwarlu (2019) demonstrated that by irradiation and addition of certain growth regulators like IAA to the medium the response of Citrilus sinensis tissue culture was enhanced. The application of physical mutagens in tissue culture has been reported by several authors (Botino, 1975 and Skirvin, 1978). There have been numerous investigations on the effect of ionizing radiation on callus tissue. Evidence of low dose radiation treatment in callus cultures have been reported (Degani and Pickholz 1973; and Sharma et. al, 1983). Stimulatory effects of low doses of ionizing radiations, not only on growth but also on differentiation in cultured plant cells was demonstrated by several workers. Induced herebic resistance, Odelu et al (2016); experimental mutagenic studies in chick pea R. Prasad et al (2018).

Key words: Stem Node, Gamma Irradiation, Cucurbita Maxima.

I. INTRODUCTION:

Numerous varieties and races are known differing in the size and shape of fruits, thickness, colour and markings on the rind, taste, flavor and colour of the inner flesh, and cultural behavior. Cucurbita Maxima is an annual climbing or creeping herb with large, soft hairy leaves and spherical, ovoid or elliptic fruits of varying size and colour. This variety resembles cucumber and is used as vegetable. The fruits are slender and elongated the length varying from a few inches to about 3ft. they are pale or dark green in colour, snooth or ridged with soft downy hairs covering the skin when tender. The members of cucurbitaceae family play a vital role in our agriculture economy as forms an important diet after cereals and legumes. Irradiation multiple shoots in Cucumis melo Venkateshwarlu (2008) Influence and morphogenetric response and callus treatment in Cucumis melo Mallaiah & Venkatehwarlu (2010). It is cultivated throughout India, particularly in the hot and dry north western areas. The skin may be soft or hard, yellow, gree, cream or orange coloured, with plain, netted or echinate surface markings. The colour of the flesh varies from white to cream- yellow orange or green. Induced Resistance herbicide resistance T Ugender (2016) and Ugender, Venkateshwarlu et al (2018) Induced U.V. rays in chick pea

II. MATERIAL AND METHODS:

In the present study the induction of multiple shoots were reported from cotyledon and shoot tip explants after gamma rays treatment. The stem node raised from control seeds could produce only callus on MS with different supplements which was regenerated into a single shoot. The cotyledon raised from seeds treated with 4, 10, 15 kR irradaiation produced a number of multiple shoots 4kR or 5kR is most potent in inducing most number of multiple shoots. The isolated in vitro raised shoots of 1-2 cm long, rooted profusely on MS medium with BAP (2mg/l) + NAA (1mg/l) within 15 days resulting in the formation of complete plantlets. The calli derived from shoot tip explants, when inoculated on MS medium supplemented with auxin or cytokinin and auxin-cytokinin, divided into fragments and served as

International Journal of Advances in Engineering and Management (IJAEM)
Volume 2, Issue 7, pp: 173-176 www.ijaem.net ISSN: 2395-5252

inocula on the same medium of similar composition when they were irradiated with low doses of gamma rays a significant increase in fresh and dry weights were observed.MS medium fortified with cytokinin along with an amino acid L- glutamic acid. The maximum percentages of cultures show growth response on MS + 2.0 mg/l L+ Glutamic acid and 0.5 mg/l, 3.0mg/l BAP.The combination of 0.5 mg/l BAP + 3.0 mg/l BAP also showed growth response in increased percentage. Growth response of callus on MS medium supplemented with cytokinin and amino acid was investigated and the results are presented in MS medium supplemented with 0.5 – 3.0 mg/l BAP + 3.0 mg/l NAA raised the callusing ability and also rooting in cultures. No response was recorded at 5kR and 10 kR. Shoot tips were cut from the plants growing in green house and were used for the initiation of callus.

III. RESULTS AND DISCUSSION:

The greatest advantage of in vitro systems is the case of treating great number of cells with mutagenic agents which has provided more effective and rapid results tha conventional techniques King (1984) reported mutagenesis in vitro as important field for crop improvement. A combination of explants irradiation and in vitro regeneration is most effective for manifestation of variants (Novak and Micke, 1987). In vitro mutagenesis was used to study the effect of gamma irradiation on morphogenesis. In the present studies variation in leaf, stem induction of callus and multiple shoot formation were observed. MS medium supplemented with 3.0 mg/l L- Glutamic acid and 0.5 mg/l BAP green and granular callus was produced. Cultures for a single inoculation period (one passage) may last for 2-4 weeks to 2 months depending on the rapidity of growth.Most of the observations and findings have confirmed the earlier reports. Stimulation was observed in all the explants at low doses (5 kR-10, 15 kR) of gamma irradiation in callus and shoot formation. A combination of 2.0 mg/l BAP and 0.5 mg/l NAA favoured formation of compact and profuse callus which is very hard in Cucurbita maxima. Effect of gamma ray irradiation on shoot bud formation and rooting efficiency of shoot tip explants cultured on MS + 1.0 mg/l L-glutamic acid + 0.5 mg/l BAP was also investigated (Table 1). At higher doses there is total suppression shoot buds. Complete lethality and no response was recorded was 10and 15 kR doses. The application of mutagens to plant culture and mutant selection from cultured plant cells has been discussed in several reviews (Skirvrin, 1987; Chaleff, 1983). The doses (4kR or 5kR Graph-1). The higher doses viz., 10, 15 and induced excessive callus growth and browning of callus. The maximum number of shoots obtained at dose of 4 and 5 kR and they ranged from 10-12 from shoottip cultures. The higher doses of the maximum number of shoots on the explants were observed at 4.0 mg/l BAP or 5.0 mg/l kinetin, but at higher level of BAP or kinetin the formation of callus had taken place and the number of shoots per explants was reducued.

Table –1. RESPONSES ON STEM NODE CULTURE OF Cucurbita Maxima.

Dose of irradiation used on seeds (kR)	STEM NODE EXPLANTS	
	MS + 2.0 mg/l L- Glutamic acid + 1.0 mg/l BAP+KINETIN	MS + 2.0 mg/l L-Glutamic acid + 3.0 mg/l BAP
Control	Callus + Shoots + Roots	Callus + Shoots
2	Rooting observed on the shoots and also on callus	globular callus
4	Callus developed profusely with single shoot	rooting
6	Profused rooting	Small shoot buds
10 TO 15	Shoot tips died and better callus growth	2-4 buds observed died soon, better callus growth

Data scored at the end of four weeks from 10 replicate cultures;
NR = No response

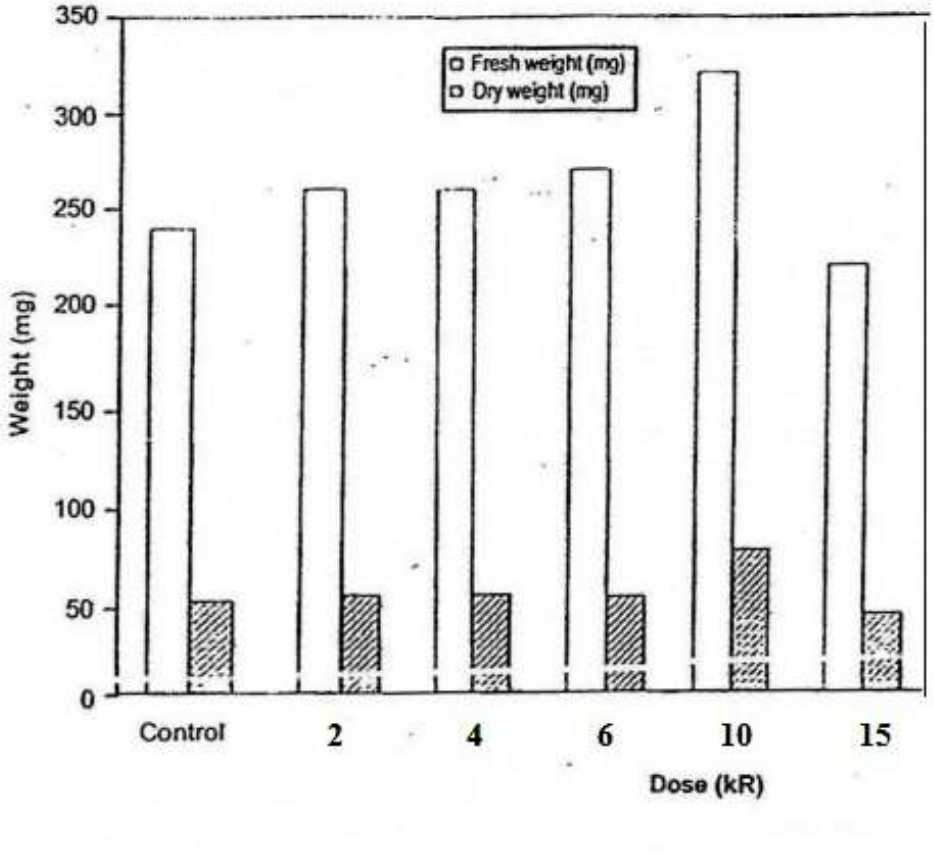
International Journal of Advances in Engineering and Management (IJAEM)
Volume 2, Issue 7, pp: 173-176 www.ijaem.net ISSN: 2395-5252

Fig.1

Fig.2

Fig.3

Graph - I. Gamma treatment on fresh and dry weight of shoottip explant in Cucurbita Maxima.



IV. CONCLUSION:

The maximum number of callus and shoots were formed in 10kR and 15kR doses. There is no rhizogenesis. Lower concentrations duration of gamma rays enhanced the callus production and initiation of smaller shoot buds. MS medium supplemented with cytokinins. Callus proliferated from cut ends with only BAP, that too with a poor percentage of response. 45% of cultures responded for callus proliferation on 3.0 mg/l BAP + 1.0 mg/l 2, 4- D. with EMS at 4 h duration produced more callus and shoots.

REFERENCES:

[1]. King PJ 1984 Mutagenesis in cultured cells. In cvell culture and somatic cell Genetics Vol. 1 (ed) Vasil I.K. Laboratory procedure and their application. Acad Press. Oriando PP 547-551.

[2]. Murashige T 1974 Plant propagation through tissue culture Annu. Rev. Plant Physiol. 25:135-166.

[3]. Novak, F.J. and Micke A 1987 In vitro Mutants technology for crop improvement in developing countries. Sabrao 19; 82-85.

[4]. Bassam A1- Safadi and Phillip W. Simon (1990). The effect of gamma irradiation on the growth of cytology of carrot (Dacus carota L) tissue culture Envr. And Exptt. Bot. **30(3**): 361-371.
[5]. Botino, P.S (1975), The Potential of Genetic manipulation in plant cell cultures for plant breeding Rad Bot.**15**: 1-6.
[6]. Deganin and Pickholz. D (1973). Direct and indirect of gamma radiation on differentiation of tobacco tissue culture. Rad. Bot. **15**: 363-366.
[7]. George L. and Rao.P.S (1980). In vitro regeneration mustard plants (brassica juncea var RA 1-5) on cotyledon explants from non-irradiated irradiated and mutagen treated seed. Ann. Bot**. 46**: 107-112.
[8]. Jain, R.K. Maher, N. Chandini, D.R. Sharma & Chowdary, J.B. (1984). Effect of gamma irradiation and gibberellic acid on growth and shoot regeneration in callus cultures of Datura innoxia curr. Sic.**53**:700-701.
[9]. Kochba and Spiegel-Roy. (1978). The use of tissue culture for mutation breeding effects of plant growth substances and gamma irradiation on embryogenesis. Pl.Br.Abs. **48**:2.
[10]. Meins,F (1983). Heritable variation in plant cell culture. Ann. Rev. Plant physiol. **34**: 327-346.
[11]. Rao, S.H.K. and Narayana swamy (1975). Effect of gamma irradiation on cell proliferation and regeneration in explanted tissue of pigeon pea (Cajanus cajan (L) Mill P) Rad Bot. **15**: 301-305.
[12]. Sharma. A.K. and Charuvedi. H.C (1988). Indian Journal of Exp. Biology **26**:285.
[13]. Skirvin, R.M. (1978). Natural and induced variation in tissue culture Euphytica **27**: 241-266.
[14]. Odelu G Ayodhya Ramulu Ch Venkateshwarlu M Anitha Devi U Ugender T (2016) Induced Heribicide Resistance in certain food legumes using in vitro techniques J.P. S.G. USA 4(3) pp 58-62.
[15]. M Venkateshwarlu and B Mallaiah (2010) Influence of gamma irradiation on morphogenetic responses in shoot tip culture of Cucumis melo CV Bathesa plant Archives Vol; 7(1) 91-92.
[16]. M. Venkateshwarlu (2008) effect of gamma rays on different explants of callus treatment of multiple shoots in cucumis melo CV Bathesa J Eniviron. Niol. 29 (5) 789-792.
[17]. Mandaloju Venkateshwarlu 92019) Tissue culture studies callus treatment on stem node explants of citrullus valgaris L perpex indian journal research vol. (8) ISS-12 No 2280-1991.
[18]. Rajendra Prasad Venkateshwarlu M Odelu G B Madan Mohan and Bapu Rao M (2018) Studies on experimental Mutagenesis on chick pea (cicer aritinum L Induced by UV rays and EMS Ejbps Vol.5 ISS-08 pp 506-511.