Analytical Methods : Amylase, Cellulase and invertase activity were assayed by the method of Miller (1959) using the substrate 1% soluble starch for amylase, 3% carboxymethyl cellulase for cellulase, 5% sucrose for invertase. Dehydrogenase was assayed by the methods of Casida *et al.,* 1964 using 2,3,5 trinitro tetrazolium chloride(TTC).

Statistical Analysis : The data were analyzed for intrinsic variations using two way Analysis of variance

RESULTS AND DISCUSSION

During the process of decomposition earthworms within few weeks converted organic waste into homogeneous mass of compost with good physical structure. Any decomposable organic matter can be used in this process along with soil. Usually cow dung is the main organic matter for vermicomposting analyses. (Brar *et al.,* 1999) while assessing the composting potential of any waste it has to be added to the cow dung control (Suthar and Singh, 2008). In the present investigation the waste matter of Eri and Tasar mixed in a fixed proportion to the cow dung control was assessed for enzymatic activity. In this investigation quality of the vermicompost by the epigeic earthworm of the culture wastes of two silkworm species *Philosamia ricini* (Eri) and *Antheraea mylitta* (Tasar) were analyzed. The worm plays a dynamic role to change the enzymatic potential of soil and convert it into quality compost during the 60 days of experimentation.

Several workers have reported that earthworms engulf microbes in their food and during passage through the gut population of this micro flora gets enhanced (Ranganathan and Parthasarathi, 1999, Abigail, 2005). The activities of enzymes during decomposition depend on earthworms as well as microbes present in soil. Amylase activity of the compost with *Perionyx excavatus* on different days (0, 15, 30, 45, and 60 days) is shown in (Fig-1).During the 60 days of experimentation amylase activity (Fig-1) increased significantly (p=0.05) in all the sets for the first 45 days then it gradually declined till 60 day period. In control set the amylase activity (µg glucose released /hr/g soil) increased significantly (p=0.05) from 1.1 to 10.9, in Eri waste supplement from 1.2 to 42.2 and in Tasar waste from 1.2 to 16.2 in 45 days. Later the activity decreased gradually to 7.1 in control set, 33.5 in Eri waste and 11.5 in Tasar waste supplement after 60 days of composting.

Cellulase is the most important of the enzymes in decomposer system (compost) being the major degrader of the plant derived organic matter. It is an extracellular enzyme for those organisms which use cellulose as carbon source. From (Fig-2) the activity of the cellulase (µg glucose released /hr/g soil) in all sets of experimentation increased significantly (p=0.05) for the initial 45 days. Later it declined gradually for the rest of the period till 60 days. The activity of cellulase during the 0-45 days was about 6 times in control, about 34 times in Eri and about 18 times in Tasar waste supplement of composting.

Similarly the invertase activity (Fig-3) of the soil also showed steady increase significantly (p=0.05) in first 45 days then gradually declined for the rest of the period till 60 days. In control the invertase activity increased from 9.6 to 40.9, in Eri waste it was 9.6 to 228.5 and in Tasar waste 9.5 to 112.1 in 45 days and later gradually decreased to 36.2 in control, 213.3 in Eri waste and 98.2 in Tasar waste after 60 days of composting. Many organic waste contain sucrose along with other complex polysaccharides which are decomposed primarily by invertase. Devi *et al.* (2009) working on fruit pulp, vegetable and groundnut waste reported initial increase in all the above three enzymes activity up to 28 days and subsequent decline till 49 days of decomposition, which supports our findings.

The activity of dehydrogenase (Fig-4) of the soil showed that it increased 8 times in control, 17 times in Eri and 9 times in Tasar during the 60days of composting. The two way ANOVA indicated a significant difference (p=0.05) in the dehydrogenase activity with days of composting and amendment types. This result supports the findings of Ramesh *et al.* (2003) and Garg and Kaushik (2005). Soil dehydrogenase activity reflects the total range of microbial oxidative activity and hence is a good indicator of soil microbial population. Therefore dehydrogenase activity is commonly used as an index of biological activity in soils (Burns, 1978).

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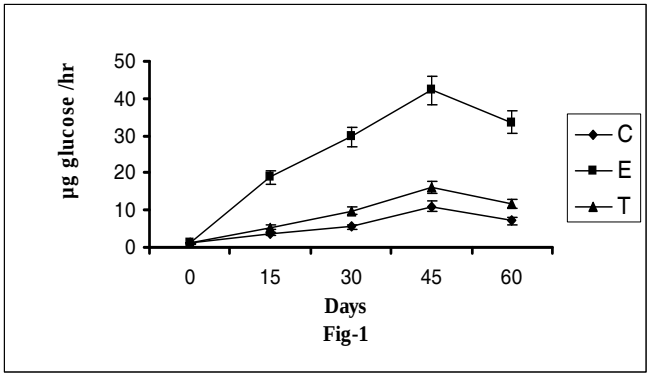

Fig. 1 : Amylase activity

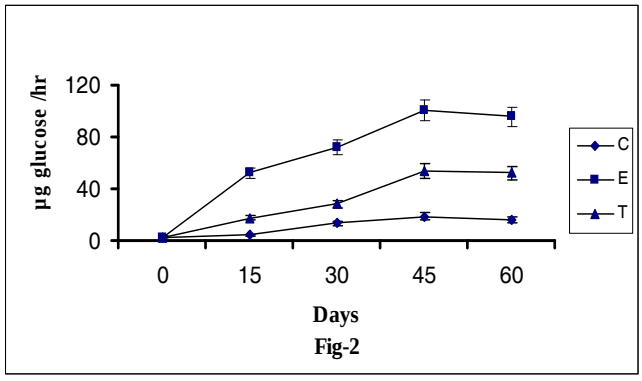

Fig. 2 : Cellulase activity

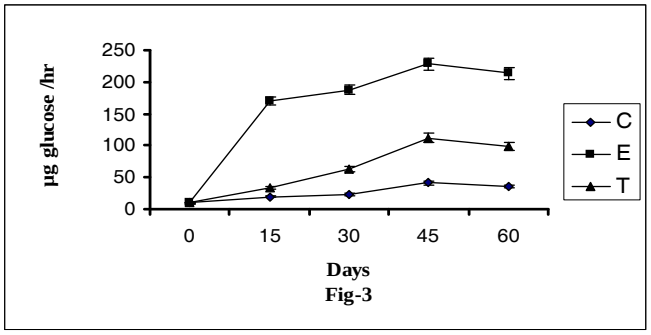

Fig. 3 : Invertase activity

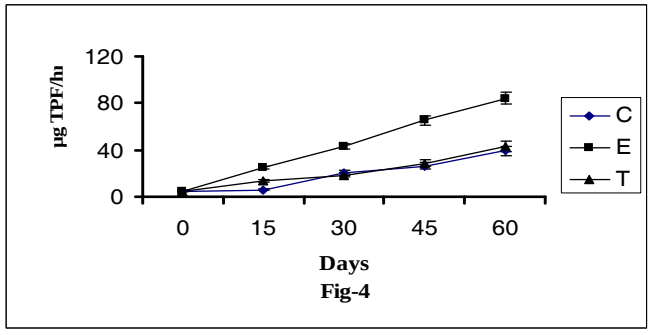

Fig. 4 : Dehydrogenase activity of air dried soil on various days of vermicomposting with amendments (C) Control no amendment, (E) Eri waste supplement, (T) Tasar waste supplement.

EFFECTS OF MUTAGENIC TREATMENTS ON CHLOROPHYLL MUTATION IN GREEN GRAM (*Vigna radiata* L. Wilczek)

T R Das* and B Baisakh

*Department of Plant Breeding and Genetics, College of Agriculture,

Orissa University of Agriculture and Technology, Bhubaneswar, 751003, Odisha, India

trdas.iari@gmail.com

ABSTRACT

A comparative study of frequency and spectrum of chlorophyll mutants induced by physical mutagen (Gamma radiation) and chemical mutagens (EMS, NG and MH) in M_2 generation of two local varieties of greengram *viz.,* Sujara and OBGG-52 were undertaken. The treatments included three doses of gamma irradiation (20 kR, 40 kR and 60 kR), three concentrations of each chemical mutagen *viz* EMS (0.2, 0.4 and 0.6%), NG (0.005, 0.010 and 0.015%) and MH (0.01, 0.02 and 0.03 %) and three combined treatments (40 kR gamma rays followed by 0.4 % EMS/ 0.01 % NG/ 0.02 % MH).The results showed that these mutagens induced five types of chlorophyll mutation *viz., albina, xantha, chlorina, straita and viridis.* EMS was found to be most efficient in inducing chlorophyll mutation. Among the mutations *chlorina* appeared in maximum frequency followed by *xantha*. The highest frequency of mutation was found in variety Sujata. Presence of wide spectrum and high frequency of mutants indicated that Sujata was more sensitive to mutagens than OBGG-52.

Key words : Chlorophyll mutation, mutagens, greengram, *Vigna radiata*

INTRODUCTION

Greengram *(Vigna radiata* L. Wilczek) is one of the important and widely cultivated pulse crops in India but the productivity is low due to lack of genetic variability and low yield potential of most varieties. To induce genetic variability and utilize useful mutants in plant breeding programme, identification of appropriate mutagen and its appropriate dose/ concentration is essential. Chlorophyll mutations are most widely employed for assessing the potentialities of mutagens in creating genetic variability. It serves as an important index in the estimation of induced genetic changes in mutagen treated population (Singh and Rao, 2007). The frequency of chlorophyll mutation in M_2 generation were considered to be a standard measure of rates of induced mutations which helps in determination of effectiveness and efficiency of mutagens and their doses or concentrations (Kumar *et al.*, 2009). Therefore, the present investigation was undertaken to study the frequency and spectrum of chlorophyll mutation induced by gamma rays, ethyl methane sulphonate (EMS), N-methyl-N¢-nitrosoguanidine (NG) and maleic hydrazide (MH) and their combined treatments in two varieties of greengram.

MATERIALS AND METHODS

Two varieties of greengram, namely Sujata and OBGG-52 were used for induction of genetic variability employing one physical mutagen *viz* gamma radiation and three chemical mutagens, namely ethyl methane sulphonate, nitrosoguanidine and malic hydrazide. The uniform, healthy and dry seeds of both varieties were exposed to 20, 40 and 60 kR doses of gamma rays (source: Gamma cell of Bhaba Atomic Research Centre (BARC), Trombay, Mumbai, India). In case of chemical treatments, the seeds were surface sterilized with 0.1% mercuric chloride solution for one minute, washed thoroughly and soaked in distilled water for