

EFFECT OF PENICILLIN-G ON THE TOTAL CHLOROPHYLL CONTENT IN THE LEAF OF SPONGE GOURD***S. P. SINGH¹ AND R. P. RAGHAVA²**¹Department of Botany,

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Received : 11.08.2018; Accepted : 01.10.2018**ABSTRACT**

A field experiment was conducted to see the effect of penicillin-G on total chlorophyll content in (*Luffa aegyptica* Mill.) The different concentrations of penicillin (25,50,100,150, and 200mg /l) were applied at pre-flowering, flowering and post flowering stages. The lower concentrations (25,50, and 100mg/l) show increasing effect on chlorophyll (in fresh leaves) content in Sponge gourd.

Figure : 01

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KEY WORDS : Chlorophyll, Penicillin, Sponge guard

Introduction

Plant growth regulators occupy an important place in the growth and developmental process of all plant species. Some of the regulators used are now so-familiar that their names have become household words^{3,4,14}. Over the past several decades, it has become increasingly obvious that the plant growth regulators control the rate of growth and pattern of differentiation in plants, acting as chemical signals. The effect varies with the plant species, its age, concentration of growth regulator employed and the environment.

The recent development of a number of growth regulating compounds, especially on antibiotic- penicillin has enhanced the potential of chemical regulation of growth in agricultural and horticultural crops. The growth regulation properties of penicillin on various plant physiological and biochemical processes have been investigated in India and abroad by many workers. Sponge gourd (*Luffa aegyptica* Mill.) is very important vegetable crop, it contain vitamins, minerals etc.

Plant Growth Regulator (PGR's) are chemical substances which modify the growth of plants, usually by stimulating or inhibiting, part of the natural growth regulating system. PGR's are generally divided into five different groups. as auxins, gibberellins, cytokinins, abscisins and ethylene^{16,33,34}. They are either natural or synthetic compounds. However, some chemical substances of plant origin, like TRIA and agrostamin and synthetic like paclobutrazol and uniconazol having

stronger growth regulating properties, are recently listed as plant growth regulators^{12,13,15,17,25,31}.

In the beginning of 20th century, the idea of growth inhibition of one microorganism present in the vicinity of other one came into existence. Later, it was demonstrated that growth inhibition of the former microorganism was mediated by secretion of toxic metabolites by the later. This toxic metabolite was termed as 'antibiotic' and the phenomenon of act of growth inhibition by antibiotics as 'antibiosis'. Among the antibiotics discovered so far, there are four major groups which are most extensively used throughout the world, the **penicillin**, **cephalosporin**, **tetracycline** and **erythromycin**. In view of these properties of penicillin, it points to the validity of assuming penicillin action being of hormonal nature.

The nutritive value of vegetable is tremendous because of the presence of indispensable mineral and nutrient. The term 'vegetables' is usually applied to edible plant which store up reserved food in roots, stems, leaves and fruits and which are eaten cooked or raw as salad. Sponge gourd (*Luffa aegyptica* Mill.) is one of the common vegetable crop grown in eastern Uttar Pradesh. Sponge gourd is said to be the native of India. It is found wild in the North-West of India. It is grown in Malaysia, Sri Lanka, Japan and Brazil. Sponge gourd has a wide adaptability and grown in almost all the states of India. Fruits are cooked as vegetables. This cucurbit is a good source of carbohydrates, Vit. A, C and minerals. Locally the plants are grown in field, as well as, kitchen gardens throughout

the district.

PENICILLIN-G

The Penicillin is said to be the “Queen of Drugs” It is the first antibiotic to be discovered. Penicillin and semi-synthetic penicillins are now a days known as “**beta-lactum**” antibiotics, as a group because of the presence of so called “**beta-lactum**” ring in the chemical structure. It is the most important of the antibiotics, was first extracted from the mould *Penicillium notatum*. Subsequently, a mutant of a related mould *P.chrysogenum*, was found to give the highest yield of penicillin and is now used for commercial production of this antibiotic.

The present work studied the effect of various concentration of Penicillin-G on the total chlorophyll content of the leaves in Sponge gourd (*Luffa aegyptica* Mill.) belonging to the family Cucurbitaceae.

Material and Methods

The seeds of Sponge gourd (*Luffa aegyptica* Mill.) procured from National Seed Corporation, IARI, New Delhi-110012 raised in the field (Research field, S.M.M. Town (P.G.) College, Ballia-277001) under normal environmental conditions (Soil-loam, pH. 6.8 under min. 14.68 and max. temperature 36.81°C). The fields were irrigated before ploughing and left for 6 days. Twelve quadrates of 10×10 feet were prepared for sponge gourd.

Seeds were sown in three rows at a distance of 30 cm. apart from each other and the distances between two rows were 30 cm. In all 15 seeds per quadrate were sown, and six quadrates were maintained for sponge gourd. The experimental plots were irrigated from time to time, when required. The plants were sprayed with 25,50,100,150 and 200 mg/l, thrice, before flowering (at vegetative phase) at interval of 10 days i.e. 25, 35 and 45 DAS and twice after flowering (at reproductive phase) at 10 days of interval i.e. 55 and 65

DAS

For the spray, Penicillin-G (250 mg) tablets were crushed and dissolved in glass distilled water at room temperature. Stock solution of Penicillin-G was prepared and five concentrations were selected for trial experiments.

The chlorophyll content was estimated². In this method 250 mg. of fresh leaves were taken, cutout in small pieces and were crushed with 10 ml of 80% acetone in a clean mortar. The content was centrifuged at 1000 rpm for 10 min. The clear supernatant was separated and the procedure repeated with the residue for complete extraction. Volume of the pooled supernatant was raised to 25 ml with 80% acetone.

The optical density of the chlorophyll extract was read in a spectrophotometer at 645 and 663 nm using 80% acetone as blank. The amount of total chlorophyll

present in the extract was calculated in terms of milligrams of chlorophyll per gram of leaf tissue, extracted as following equation-

mg. Total chlorophyll/g tissue=

$$20.2 (\text{OD } 645) + 8.02 (\text{OD } 663) \times \frac{V}{a \times 1000 \times w}$$

where, OD is the optical density obtained of the extract at the wave lengths specified, V the final volume of the extract, W the fresh weight in grams of the tissue extracted and 'a' length of path light in the cell (1cm).

Result and Discussion

The observations were taken after five days of spray i.e. 30, 40, 50, 60 and 70 DAS. Chlorophyll content of the leaves was measured at 30, 40, 50 and 60 DAS, which showed a significant increase with 50 and 100 mg/l, in all the observations. Other concentrations showed non-significant changes, in all the observations. At initial stages of observation (30 DAS) the increase was maximum with 100 mg/l i.e. 27.00% but at later stages 40, 50, and 60 DAS, the increase was 11.32, 21.41 and 19.22% respectively over control (Fig.1).

The role of penicillin as a plant growth regulator, on higher plants morphophysiological and biochemical aspects was worked out. But so far, little published material is available on various aspects of the plant metabolism. The present study was following the encouraging results^{1,5-11,18-22,24,32} from treating seeds and foliar spray of various crops.

An increase in total chlorophyll content (leaves) was recorded in all the concentrations of penicillin, which was maximum in 100 mg/l, Sponge gourd (*Luffa aegyptica* Mill.). The possible mode of action of penicillin has indicated that it increased root and shoot length, at the early stages of growth and helps plant to grow vigorously. The greater root growth increased the mineral uptake, along with iron, which is important for biosynthesis of chlorophyll. So, penicillin helps in increasing the chlorophyll content or the green matter of the leaves, which helps in increasing the plant productivity.

On the basis of trial experiments, 25, 50, 100, 150 and 200 mg/l of Penicillin-G was selected, which were found to be the effective concentrations, as far as, all the above mentioned parameters are concerned. Beyond 200 mg/l (250, 300, 400 mg/l) showed almost lethal effects, like 500 mg/l or above i.e. LD₅₀ doses or concentrations, for all the parameters studied.

Lastly, it can be concluded that range of plant responses points to the possibility of penicillin action being a conceptual breakthrough in phyto-hormone research. Since, the range of plant growth regulators that can be exploited or explored for increasing production through

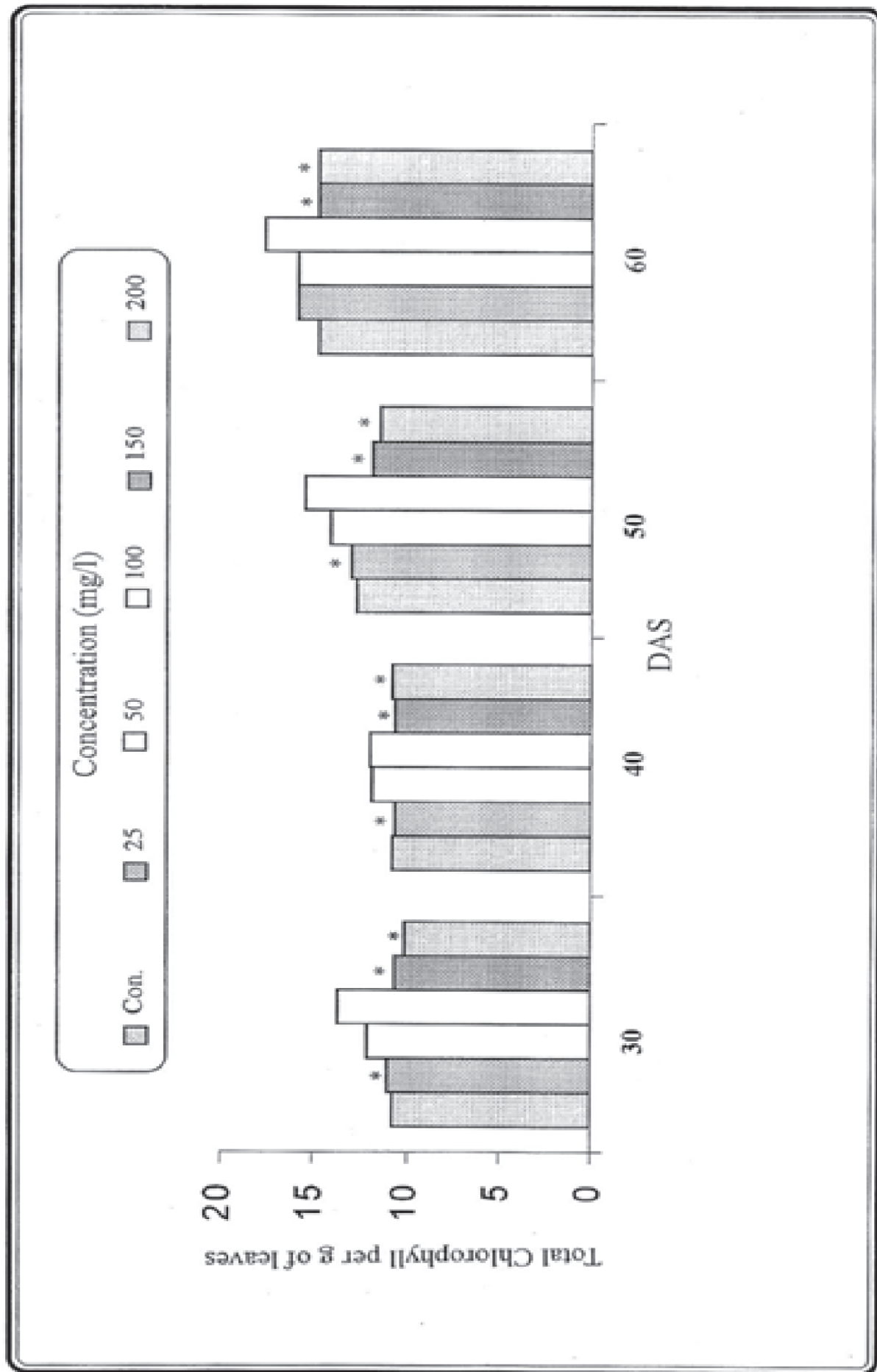


Fig. 1 : Effect of Penicillin-G on the Total Chlorophyll content of the leaves in sponge gourd. All the values are average of three replicates
 * : Non-significant DAS : Days after sowing

more efficient plant performance will certainly continue to expand²³. These results obtained so far with penicillin will definitely brighten the hope for agricultural and

horticultural application of the antibiotic, pertaining to plant hormone-penicillin link-up. So, we can recommend, 100 mg/l which will certainly benefit them, qualitatively as well as quantitatively.

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