



CALLUS INDUCTION STUDIES IN *PSOPHOCARPUS TETRAGONOLOBUS* (L.)

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ABSTRACT

Psophocarpus tetragonolobus (L.) is an important nutritious and valuable crop of family (Leguminosae). It has potential of meeting the dietary needs of many people and yields more usable protein per unit area than any other legume. Winged bean as richest source of protein and oil with the exception of soybean and ground nut. An efficient protocol for callus induction of *Psophocarpus tetragonolobus* (L.) (Winged bean) was developed. Explants were cultured on Murashige and Skoog (MS) basal medium supplemented with 1.0-1.2 mg/l 2, 4 D and 0.01-0.03 mg/l Kinetin for callus induction. The better and profuse callus induction was found in MS medium supplemented with 1.2 mg/l 2, 4 D & 0.03 mg/l Kinetin from Petiole and Epicotyl explants. Petiole and Epicotyl explants get better and early response as compared to other explants such as Leaf, root and hypocotyl etc.

Keywords: *Psophocarpus tetragonolobus*, Callus induction, Explants.

INTRODUCTION

Agriculture outcome is unable to meet the basic needs of a humanity suffering from hunger and malnutrition. Yet, global food security is increasingly demandable based on an animal and plant species. About 95% of the worlds' food energy needs is provided by just 30 plant species and 50% of the requirement for protein and calories is met just by maize, wheat and rice¹. But there are many underutilized crops that can make important contributions to the nutrition and health of people in developing countries. The winged bean, *Psophocarpus tetragonolobus* (L.) DC, is a member of the Leguminosae family. The winged bean is a strong growing, twining perennial legume with large beautiful pale blue flowers. The plant is thought to have originated along the east coast of Africa and it is cultivated throughout most of South-East Asia, from Burma to Malaysia². Its green pods, dried seeds, fresh leaves, flowers and the tuberous roots may all be eaten and all are rich in protein. Its economic potential importance has attracted worldwide attention in the last decades because of its high nutritional Value that equals to that of soybean³⁻⁵. Generally, it prefers a loamy slightly acidic soil, but there are cultivars suitable for many soil types⁶. Temperatures in the range of 25 - 30°C are necessary for optimum growth. Tissue culture regeneration system is used for rapid multiplication and also for genetic improvement of this crop. In vitro plant regeneration from various explants and callus has been reported in winged bean^{7, 8} but there is no report on callus induction from Petiole, Epicotyl, Leaf and Hypocotyl. Due to its highly nutritious & chemical property it is essential to study this plant for future benefits to meet basic need. In the present study, callus induction studies explained better explant for secondary metabolite production.

MATERIALS AND METHODS

The mature seeds of winged bean were obtained from 'Shree Shell', Nagpur. The seeds were maximum germinated with Conc. H₂SO₄ treatment for 10 min. Explants such as Petiole, Epicotyl, Leaf, Root and Hypocotyl were taken and then sterilized with the help of 20 % Sodium hypochlorite and 70% ethanol for 2 min, followed by washing in distilled water under aseptic condition on laminar air flow chamber. Explants were cut by scalpel and inoculated on MS⁹ medium supplemented with varying concentration of 2, 4 D (Dichlorophenoxyacetic acid) and Kinetin in the range 1.0 -1.2 mg/l 2,4 D and 0.01-0.03 mg/l Kinetin for callus induction¹⁰.

Petiole and Epicotyl explants for profuse callus induction

Petiole and Epicotyl explants were inoculated on MS basal nutrients salt medium including vitamins supplemented with varying concentration of hormone in medium included 3 gm sucrose and were solidified with 0.8 gm agar. Medium was adjusted at pH 5.8 using 1N NaOH and 1 N HCl. The sterilized explants were cultured under laminar air flow chamber. The cultures were maintained at 25±2°C and 65% humidity in plant growth chamber.

RESULTS

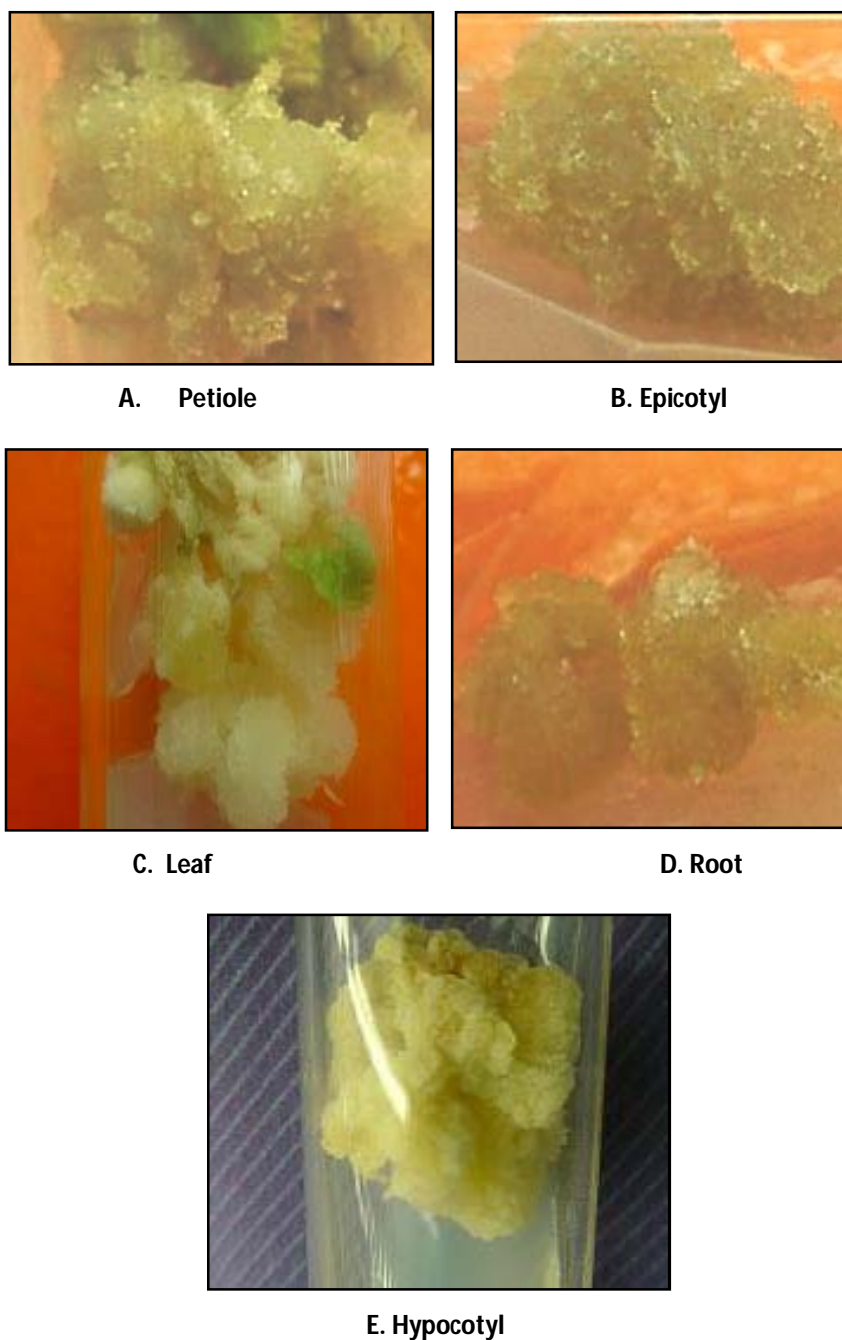
In the present study we have evaluated the effect of 2, 4 D and Kinetin on various explants such as Petiole, Epicotyl, Leaf, Root and Hypocotyl. The results are presented in (Table 1 and Figure 1). All other hormone concentration was found to be responsible for the development of callus from various explants, the 1.2 mg/l 2, 4 D & 0.03 mg/l Kinetin were the best hormone concentration used for callus induction among all the concentration. All Explants were showing some response in the medium but Petiole and Epicotyl explants were shown better response.



Table 1: Effect of 2, 4 D & Kinetin on different explants of *P. tetragonolobus*

Explant	Hormone concentration taken (mg/l)		
	1.0 mg/l 2,4 D & 0.01 mg/l Kinetin	1.1 mg/l 2,4 D & 0.02 mg/l Kinetin	1.2 mg/l 2,4 D & 0.03 mg/l Kinetin
Petiole	++	+++	++++
Epicotyl	++	+++	++++
Leaf	+	++	+++
Root	-	-	+
Hypocotyl	-	+	++

Degree of callusing: - absent, + poor callus, ++ medium callus, +++ good callus, ++++ profuse callus
Nature of callus- friable and greenish white in color

**Figure 1: Callus induction from different explants**

DISCUSSION AND CONCLUSION

Yellowish white friable calli were developed from explants such as Leaf, Root and Hypocotyl. But, greenish white, fast growing, friable callus developed from Petiole and Epicotyl explants. Callus initiation was observed within 8 days and induction within 28 days. Petiole and Epicotyl explants were showing early and profuse callus induction. As we go to higher hormone concentration to get maximum and early response of callus. However, some differences exist between these and earlier reports because in this study callus induction was developed from Petiole, Epicotyl, Leaf, Root and Hypocotyl. Finally, the protocol of efficient callus induction from Petiole and Epicotyl reveal to select different calli for biotechnological appliances.

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