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SUITABILITY OF DEPROTENISED JUICE (DPJ) AS A MEDIUM FOR CELLULASE PRODUCTION

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Deprotenised leaf juice (DPJ) is a by-product of green crop fractionation process. Altogether eight different fungi were cultivated on lucerne deprotenised leaf juice for mycelium and cellulase production. The maximum mycelial dry weight and cellulase activity was observed in *Aspergillus niger, A. flavus, Penicillium citrinum, Fusarium moniliformae, Trichoderma viride* and *Alternaria alternata*. Hence, deprotenised leaf juice may be considered as a useful medium for production of fungal metabolites.

Keywords : Cellulase; Deprotenised juice; Dry mycelium.

The process of green crop fractionation (GCF) has been advocated for producing high quality feed and food products from green leaves[1]. During GCF fresh green foliage is macerated to pulp which is subsequently pressed, as a result of pressing juice is released leaving behind pressed crop residue (PCR). When the juice is heated to above 90°C, proteins in it coagulate and precipitate to curd referred as leaf protein concentrate (LPC). The LPC (a food grade product) can be separated from remaining portion of extract, known as deproteinized juice (DPJ) by filtration through cheesecloth. The DPJ is considered as a by-product of GCF system which contains soluble nutrients from plant cell[2]. The by-product may cause environmental bio-pollution if it is disposed randomly. To avoid this, its proper utilization is necessary. It is used as fertilizer[3] and a medium for growing useful microorganisms[4]. The DPJ of lucerne is also used for production of single cell protein from *Candida atropicalis*[5]. However, DPJ is also recommended for antibiotic production[6]. This paper reports the possibility of DPJ as a medium for cultivation of fungi and production of cellulase enzyme.

Lucerne (*Medicago sativa* L.) was harvested at the pre-flowering stage early in the morning. The leaf extract released due to pressing was collected and immediately heated to 95°C in stainless steel pot. The heated extract was filtered through four-folded muslin cloth to separate deprotenised leaf juice from leaf protein concentrate. The deprotenised leaf juice was collected and employed for further experiments as a growth medium. The different fungi were cultured on glucose nitrate (GN) medium as well as on 2% solution of deprotenised leaf juice at 27 ± 3°C for eight days. The fungal biomass was harvested and dry mycelium weight (DMW) was recorded. The cellulase activity was determined in terms of CMCase

Table 1. Production of dry mycelial weight and cellulase by different fungi on DPJ.

Sr.No.	Fungi	DMW (mg / 25ml)		Cellulase (mg / ml /hr)	
		GN medium	DPJ 2 %	GN medium	DPJ 2 %
1	*Alternaria alternata*	141	174	6.00	9.82
2	*Aspergillus flavus*	157	172	0.80	8.80
3	*Aspergillus niger*	169	317	0.48	2.68
4.	*Curvularia lunata*	176	210	5.10	5.58
5.	*Fusarium moniliformae*	128	190	8.40	8.56
6.	*Helminthosporium tetramera*	122	167	4.00	6.64
7.	*Penicillium citrinum*	190	328	2.28	10.8
8.	*Trichoderma viride*	192	242	2.08	9.36
	Mean	159	225	3.64	7.78
	S.D.	25.2	60.8	2.56	2.48
	C.V.%	15.8	27.0	70.3	31.9
	t	2.836		3.280	

through measuring the reducing sugar by DNS reagent[7].

Data presented in Table 1 reveals that dry mycelial weight was higher in deprotenised leaf juice than that on GN medium. It was noted that *Aspergillus niger, Penicillium citrinum* and *Fusarium moniliformae* gave more dry mycelial weight than other ones. However, activity of cellulase was higher in *P. citrinum, A. flavus* and *Trichoderma viride* when compared with other fungi. This work was supported in relation with the growth of *Fusarium* spp., *Trichoderma* spp. and *Aspergillus* spp. on deprotenised leaf juice of Lucerne[8]. The data depicts that there was significant increase in fungal growth and cellulase production due to cultivation of fungi on deprotenised leaf juice. It was also reported that eight different fungi were cultured on deprotenised leaf juice of Napier grass[9,10]. The deprotenised leaf juice from ten different plant species could be used for cultivation of *Penicillium* spp[11]. The present study has shown that the deprotenised leaf juice, a by-product can be employed as a fungal medium for production of different enzymes.

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References

1. Pirie N W 1942, Green leaves as a source of proteins and other nutrients. *Nature* **149** 251
2. Ream H W, Jorgensen N A, Coagel R G and Bruhm H D 1983, On farm forage harvesting: plant juice protein production systems in a humid temperate climate. In: *Leaf protein concentrates.* (Ed.) Telek L and Graham HD AVI Publishing Inc Westport, Connecticut, pp 467.
3. Salve P B and Gangawane L V 1984, Whey irrigation to rhizosphere microflora and nodulation in groundnut. In: *Current trends in life sciences.* Vol XI (Ed) Singh N. Today and Tomorrows Printers and Publishers, New Delhi. pp 391.
4. Jonsson A G 1962, Studies in the utilization of some agricultural wastes and by-products by various microbial processes. *K. Lantbr Hoask Annular.* **28** 235.
5. Baukhandi S S, Andhale M S and Khandelwal S R 1984, Single cell protein (SCP) production from LPC waste by yeasts. In: *Current trends in life sciences.* Vol XI (Ed) Singh N. Today and Tomorrows Printers and Publishers, New Delhi. pp 373.
6. Chanda A 1985, Studies on the growth of *Curvularia lunata* and *Cladosporium herbarum* on deprotenised leaf juice for single cell protein production. *Indian Bot. Reptr.* **4(2)** 176 – 177.
7. Robertson L D and Koehn R D 1978, Characteristics of the cellulase produced by the ascomycetes *Poronia punctate. Indian Phytopath.* **78** 11 – 13.
8. Worgen J J and Wilkins R J 1977, In: *Green crop fractionation* (Ed) Wilkins RJ. Occasional symposia, Br. Grassld, Soc., Maidenhead UK pp 119.
9. Deshpande K S and Joshi R N 1971, Deprotenised leaf extract substrate for fungal growth. *Mycopath. Mycol. Appl.* **45** 151 – 155.
10. Ghewande M P and Deshpande K B 1975, Deprotenised leaf extract as a substrate for fungal growth. *Indian J. Microbiol.* **15** 33 – 34.
11. Ajaikumar K 1989, Extraction of protein from green foliage. *Ph.D. Thesis* Marathwada University, Aurangabad, Maharashtra, India.