

## Bioproduction of ergot alkaloids exposed to 1,4-butane diol methane sulphonate

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**Abstract :** Bioproduction of ergot alkaloids by *Claviceps purpurea* H-8 was carried out using 20% sucrose solution at 26°C and pH 5.4 in 9 days of optimum incubation period along with incorporation of 1,4-butane diol methane sulphonate. The results show that addition of 1,4-butane diol methane sulphonate to the production medium stimulates the fermentation process and thereby enhances the yield of ergot alkaloids.

**(Keywords :** Ergot alkaloids fermentation, 1,4-butane diol methane sulphonate and *Claviceps purpurea* H-8).

### Introduction

The ergot alkaloids are mycotoxins produced by several species of fungi in the genus *Claviceps*. The name ergot means 'spur' in French, since grains colonized with *Claviceps* spp. often resemble the spurs on the legs of a rooster

The requirement of organic molecules by microbes are not well established<sup>1-8</sup>. In recent years a few attempts have been made to study the efficacy of some organic compounds on the enzyme systems participating in the process of fermentation.<sup>9-10</sup> The present paper was undertaken to assess and analyse the production of ergot alkaloids by *Claviceps purpurea* H-8 exposed to 1,4-butane diol methane sulphonate.

### Experimental

The medium used for production of ergot alkaloids was composed of the following:

Sucrose : 200.00g; citric acid : 20.00g ; Yeast Extract : 0.15g ;  $\text{KH}_2\text{PO}_4$  : 0.55g ;  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$  : 0.55g ;  $\text{KCl}$  : 0.15g ;  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  : 0.010g ;  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$  : 0.008g; pH : 5.4 Adjusted by  $\text{NH}_4\text{OH}$  Distilled water to make up 1000 ml.

Now from the above composition 100 ml of the production medium was taken into 250 ml conical fermenter flask. The flasks were plugged with non absorbent cotton wool plugs and sterilized in an autoclave maintained at 15 lbs steam pressure for 30 minutes for production of ergot alkaloids by submerged fermentation using the fungal strain of *Claviceps purpurea* H-18.

### Strain :

*Claviceps purpurea* H-8 has been used in the present study.

### Assay method :

Evaluation of total ergot alkaloids formed was made colorimetrically described by Pacific *et al.*<sup>11</sup> using Van Urk's reagent<sup>12</sup> modified by Smith<sup>13</sup> based on the formation of a blue colour with the addition of Van Urk's reagents.

### Concentration of the 1,4-butane diol methane sulphonate used :

M/10 solution of 1,4-butane diol methane sulphonate has been prepared and 1.0 ml to 10.00 ml of this solution were incorporated to the production medium ( $1^{\text{st}}$  to  $10^{\text{th}}$  set respectively). The control flasks contained no dimethyl alloxan.

**Table - 1**  
**Bioproduction of ergot alkaloids exposed to 1,4-butane diol methane sulphonate**

| Concentration of mutagen used        | *Yield of ergot alkaloids in mg/100ml |         |         | % Difference in the yield of ergot alkaloids after 9 days |
|--------------------------------------|---------------------------------------|---------|---------|-----------------------------------------------------------|
|                                      | 8 days                                | 9 days  | 10 days |                                                           |
| Control – mutagen                    | 610                                   | 8.91    | 803     | –                                                         |
| 1.0 x 10 <sup>-3</sup> M + mutagen   | 610                                   | 892     | 805     | (+) 0.11223                                               |
| 2.0 x 10 <sup>-3</sup> M + mutagen   | 612                                   | 894     | 808     | (+) 0.33670                                               |
| 3.0 x 10 <sup>-3</sup> M + mutagen   | 616                                   | 898     | 811     | (+) 0.78563                                               |
| 4.0 x 10 <sup>-3</sup> M + mutagen   | 619                                   | 903     | 813     | (+) 1.34680                                               |
| 5.0 x 10 <sup>-3</sup> M + mutagen   | 620                                   | 908     | 800     | (+) 1.90796                                               |
| 6.0 x 10 <sup>-3</sup> M + mutagen   | 640                                   | 980     | 862     | (+) 9.98877                                               |
| 7.0 x 10 <sup>-3</sup> M + mutagen   | 650                                   | 989     | 871     | (+) 10.99887                                              |
| 8.0 x 10 <sup>-3</sup> M** + mutagen | 671                                   | 1012*** | 883     | (+) 13.58024                                              |
| 9.0 x 10 <sup>-3</sup> M + mutagen   | 668                                   | 1000    | 876     | (+) 12.23344                                              |
| 10.0 x 10 <sup>-3</sup> M + mutagen  | 662                                   | 998     | 872     | (+) 12.00897                                              |

\* Mean of three observations, \*\* Optimum concentration of dimethyl alloxan

\*\*\* Optimum yield of ergot alkaloids, (+)ve values indicate % increase in the yield of ergot alkaloids  
 Experimental deviation ( $\pm$ ) 1.5% to 3.5%

## Results and Discussion

The influence of 1,4-Butane diol methane sulphonate (table-1) on ergot-alkaloids fermentation was significant. All the concentrations of 1,4-butane diol methane sulphonate increased the fermentative production of ergot-alkaloids by the fungus *Claviceps purpurea* H-8. However,

the higher concentrations of 1,4-butane diol methane sulphonate was more favourable for the fermentative production of ergot alkaloids, i.e. 1012 mg/litre at 8.0 x 10<sup>-3</sup> M which is 13.58%, higher in comparison to control but at lower concentrations of 1,4-butane diol methane sulphonate i. e. 2.0 x 10<sup>-3</sup> M to 5.0 x 10<sup>-3</sup> M, the yield of ergot-alkaloids was slightly better than that of control, i. e., 891 mg/litre in 9 days of incubation period. Mahna<sup>14-16</sup> reported the mutagenic nature of ethyl methane sulphonate and Khan<sup>17-21</sup> observed genotypic relative std. deviation from control by EMS in mung bean.

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