

### Cultivation of *Botryococcus braunii*

#### 1. Introduction:

*Botryococcus braunii* is a unicellular, colonial microalga. It is the member of chlorophyceae (chlorophyta). It exhibits the typical morphology characterized by a botryoid organization of individual pyriform-shaped cells held together by a refringent matrix containing lipids, which some times links two or more distinct clumps of cell. The matrix, surrounding the basal part of the cells consists of outer walls originating from successive cell division and bulk of the hydrocarbon is stored in these outer walls, reproduce asexually by autospore and sexually by fertilization of egg and sperm (Largeau *et al.*, 1980).

Paleobotanical (fossil) studies suggested that *Botryococcus braunii* is one of the major hydrocarbon sources in a variety of oil rich deposits, which are dated from Ordovician period to the present (Canc. 1977). Therefore, based on all these evidences and history it can be concluded that the *B. braunii* could be exploited as a source of bio-fuel. Hydrocarbon content is the order of 15-20% of its dry mass.

#### 2. Use:

*B. braunii* is regarded as potential source of renewable fuel. Being “natural” fuel, it is biodegradable and non-toxic. Biofuels from *B. braunii* is free from oxides of sulphur and nitrogen and lead emissions. *Botryococcus* being a fresh water alga the out door cultivation would be eco-friendly. Another potential use of the bio-mass is for the nutraceutical application - Methylated fatty acids, lutein and other bio-actives can be of use as pharmaceuticals or nutraceuticals.

After the extraction of the hydrocarbon, the left over bio-mass can be used as feed or manure.

#### 3. Raw Material:

Suitable quality water, media chemicals and the strain of *Botryococcus braunii*

#### 4. Process:

Algal slants → Conical flasks → Carboy culture → Outdoor tanks → Filtration  
Biomass → Drying (sun drying).

#### 5. Plant & Machinery:

Raceway ponds with Paddle wheels, Effluent treatment plan, Circular pond, Harvester and sun drying facility.

**6. Project Cost – Fixed Cost – Working Capital (in Rs. ‘000)  
(Estimate for a model project):**

|  |                |
|--|----------------|
| a) Land & Land development (6000 m <sup>2</sup> )                  | 300.00         |
| b) Building and civil works (1800 m <sup>2</sup> ) including ponds | 500.00         |
| c) Plant and machinery   | 1165.00        |
| d) Auxiliary equipments  | 959.00         |
| e) Other fixed assets  | 112.00         |
| f) Pre-operative expenses  | 518.00         |
| <b>Total fixed capital</b>   | <b>3554.00</b> |
| Working capital margin   | 140.00         |
| <b>Total Project cost</b>  | <b>3694.00</b> |

**Means of finance:**

|                          |         |
|--------------------------|---------|
| - Promoters contribution | 2277.00 |
| - Term loan              | 1417.00 |

**7. Production Capacity- (estimate):**

Suggested economic capacity: 10000 kg of hydrocarbon rich *Botryococcus* biomass per annum

Working: 300 days per annum

Production per day: 33.3 kg of *Botryococcus* biomass

**8. Technology/Manufacturing Process – Availability:**

The technology for the Cultivation of *Botryococcus braunii* has been developed at CFTRI, Mysore, using appropriate equipment for optimal product recovery of right quality. The CFTRI has the necessary expertise to provide technical assistance and guidance for setting up the project. CFTRI can offer further technical assistance for project implementation for scale up - of advisory nature under technical consultancy services.