



Disposable bioreactors represent rational alternatives to traditional cultivation systems eliminating any need for cleaning or sterilisation of vessel and autoclaving of reactor. Disposable bioreactor bags are low cost, simple to operate and guarantee high process security. Wave based single-use bioreactor technology is a well-established and proven in cultivation of plant suspension cell cultures, yet associated with high initial cost. The aim of this study was to initially evaluate the potential of MR-12 application as the disposable wave bioreactor platform. Disposable, γ irradiated PE bags in combinations with MR-12 were used for cultivation of *Dracocephalum sp.* cell cultures and production of secondary metabolites (phenolics).

Biosan Rocker-Shaker MR-12 was used for cultivation of plant suspension cell cultures under ambient room temperatures in dark and semi-dark conditions.

General operational parameters used during the Fed Batch cultivations.

RPM: 10-15

Angle: 7-10 degrees.

Temperature: 25 °C

Max continuous operational time: 950 h.

Cultivation type: Fed Batch

Cultivation volume: 2,0 - 4,5 l

Gas flow (air): 0,05-0,1 l/l*min

By providing mixing at various speeds and adjustable tilt angles, MR-12 offered a simple, yet potentially low-cost platform that might serve as alternative to commercially available wave reactors. Obtained results (summarized in Table 1.) reveal similar plant cell biomass production as in commonly used stirred tank bioreactors and shaken flasks - growth pattern of plant cells in MR-12 is shown in Fig 1. Growth of plant suspension culture in MR-12 revealed typical exponential pattern with subsequent lag, log and stationary phases and similar relative growth rates as in shake flasks and stirred tank bioreactors (not shown). Comparison of total phenolics (Table 1) revealed almost 1,5 times higher phenolic yields in MR-12 and shake flasks than in stirred tank bioreactors.

	Volume l	Air flow (v/v/m)	Growth index	Total phenolics (mg/g d.w) *
Shake Flask	0,5	-	4,90 +/-0,95	17,01 +/- 1,17
Bioreactor 0,5 l	0,5	0,14	4,52 +/-0,92	11,20 +/- 2,59
Biosan MR - 12	2,0-4,5	0,1	5,48 +/- 1,91	17,52 +/- 1,09

*Gallic acid equivalents determined using Folin-Ciocalteu method.

Table 1. Comparison of plant suspension culture growth and total phenolic parameters between, shake flasks, stirred tank bioreactors and Biosan MR -12.

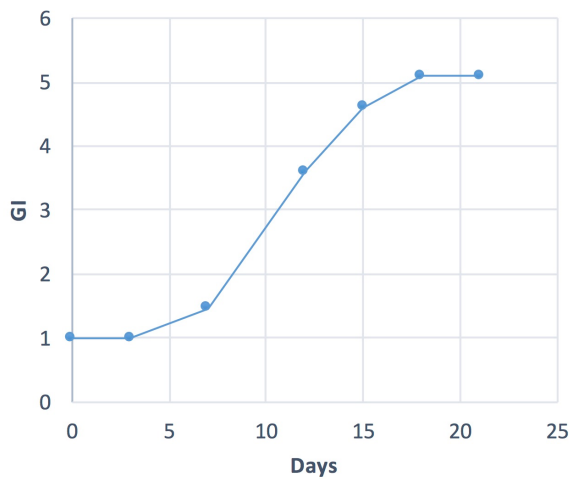


Figure 1. Growth of plant suspension culture in MR-12.

Thus, comparable growth rates and sufficient production of secondary metabolites makes MR-12 a feasible alternative to typical wave reactors. Also, few MR-12 design features can be further developed for plant suspension cell culture specific needs, in general “Alternative Plants” ltd consider the application of MR-12 for initial inoculum preparation. Increase of the max load capacity and platform size as well addition of few minor design features can further widen the application spectrum of MR-12 rocker shaker towards small/medium scale industrial applications.