Removal of malachite green dye by *Parthenium hysterophorus*: safe strategy for weed management

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Every manufacturing industry uses dye to colour their products, but unfortunately residual and unspent dyes are discharged without any proper treatment directly into the water bodies (Papinutti *et al.* 2006). Dyes are one of the major water pollutants which adversely affect agriculture and environment as these are synthetic chemicals which may contain some toxic components such as metals and chloride. Thus, removal of dye from the industrial waste effluent is one of the challenging tasks for the environmentalists. *Parthenium hysterophorus* is unwanted weed and its huge biomass is available round the year. This weed can be used for the treatment of industrial effluent due to its dye adsorption capacity. The aim of the present work was to study the adsorption capacity of *Parthenium* weed for the removal of malachite green dye from aqueous solution under different experimental conditions.

METHODOLOGY

The healthy plants of *Parthenium hysterophorus* were collected from the road sides and waste lands near Amity University campus, Noida and leaves of *Parthenium* weed were dried in shade for 72 hours. Then the dried leaves were powdered in grinder and leaf powder was used as adsorbent. An aqueous solution of malachite green dye (100 PPM) was prepared by using distilled water and the pH was measured. Batch experiments were conducted to study the effect of different parameters i.e. pH, exposure time and amount of adsorbent for the removal of malachite green dye. An aliquot of 100 ml of dye solution was treated with different amount of *Parthenium* leaf powder such as 0.5g, 1.5g and 2.5g at different pH and interval of 30, 60 and 90 minutes respectively. The optical density was taken at 617 nm by using UV/VIS spectrophotometer. The percentage removal of dye was estimated by using the following formula:

Removal efficiency (%) = $(C_o - C_e/C_o) \times 100$

Where C_o = initial concentration of dye (mg/l)

C_e = final concentration of dye (mg/l)

RESULTS

In the present study, *Parthenium* leaf powder was used as adsorbent and percentage removal of malachite green dye was analyzed at different pH and time with different amount of adsorbent. Maximum removal (82%) of malachite green dye was observed at pH 5.8after 60 minutes of exposure of 2.5g dry leaf powder of *Parthenium hysterophorus* per 100 ml of aqueous solution. Increase in adsorption of malachite green dye with increase in adsorbent amount can be attributed to increased adsorbent surface area and availability of more adsorption sites (Mulugeta and Lelisa, 2014). Thus, this new method can be used widely due to its dual significance as it is useful for the management of*Parthenium hysterophorus* weed as well as it removes dye from aqueous solution.

Table 1. Removal of malachite green dye by different amount of leaf powder of *Parthenium hysterophorus* at pH 5.8after 60 minutes of exposure time

Sr.no	Amount of adsorbent* (g)	Removal of malachite green dye (%)
1.	0.5	43
2.	1.5	61
3.	2.5	82

CONCLUSION

The present study clearly indicates that the treatment of malachite green dye by using leaf powder of *Parthenium* weed is a simple, cost-effective and eco-friendly technology as it has significant potential of reducing colour. The data of the present investigation may be useful in fabrication of new economically viable treatment process by utilization of batch tank flow reactors for the removal of dye from industrial waste effluent. This serves as alternate strategy to contain the menace of *parthenium.*

REFERENCES

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