

# A novel biodegradable device to combat and prevent water eutrophication

## Hypotheses

It was hypothesized that if a packet composed of dehydrated banana peel powder is placed in eutrophicated waters, then the phosphate and nitrate levels of the water will decrease. Additionally, it was hypothesized that if the concentrated potassium-nitrate non-synthetic fertilizer created with a used banana peel sachet is used, then plants will grow at the same rate as if currently available fertilizer was used.

## Engineering Goals

The goal of this project is to not only create a sachet full of agricultural waste (dehydrated banana peel powder) to lower nitrate and phosphate levels in eutrophicated water through the processes of coagulation and flocculation but also have the used dehydrated banana peel powder packet double as a concentrated potassium-nitrate non-synthetic fertilizer that can be sold on the market to farmers to spread on fields.

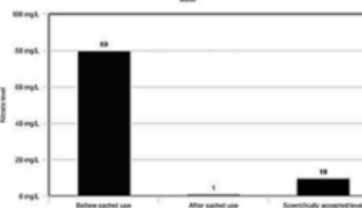
Table 1: The effect of the dehydrated banana peel powder sachet on the nitrate levels of the scientifically generated eutrophicated water

Trial #	Nitrate level before sachet use (mg/L)	Nitrate levels after sachet use (mg/L)	Change in nitrate levels (mg/L)
1	80	0	80
2	80	0	80
3	80	0	80
4	80	5	75
5	80	0	80
6	80	0	80
7	80	0	80
8	80	0	80
9	80	0	80
10	80	5	75
AVG	80	1	79

Table 2: The effect of the dehydrated banana peel powder sachet on the phosphate levels of the scientifically generated eutrophicated water

Trial #	Phosphate level before sachet use (ppm)	Phosphate levels after sachet use (ppm)	Change in phosphate levels (ppm)
1	2.00	0.25	1.75
2	2.00	0.00	2.00
3	2.00	0.25	1.75
4	2.00	0.25	1.75
5	2.00	0.25	1.75
6	2.00	0.00	2.00
7	2.00	0.00	2.00
8	2.00	0.25	1.75
9	2.00	0.00	2.00
10	2.00	0.25	1.75
AVG	2.00	0.15	1.85

Graph 1: The effect of the dehydrated banana peel powder sachet on the nitrate levels of the scientifically generated eutrophicated water



Graph 2: The effect of the dehydrated banana peel powder sachet on the phosphate levels of the scientifically generated eutrophicated water

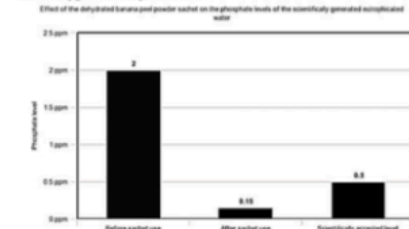


Table 3: The effect of fertilizers on plant growth

Trial #	Control- No fertilizer (cm)	Concentrated potassium-nitrate non-synthetic fertilizer (cm)	Nitrate level (mg/L)
1	15.8	34.2	23.9
2	20.3	34.3	22.4
3	19.3	33.3	24.1
4	18.4	37.6	22.9
5	12.8	37.5	22.6
6	23.9	32.5	24.6
7	18.7	32.7	24.8
8	23.4	36.8	29.2
9	18.6	33.2	25.8
10	20.6	33.0	25.6
AVG	19.48	34.62	24.59

Graph 3: The effect of fertilizers on plant growth

