Extraction of Mangiferin and utilization of waste leaves as black gold
Vrushali Kulkarni (V K. Rathod)

Graphical Abstract
Objective
Waste leaves generated are usually dumped or burnt causing environmental problems. Through our study proper management of the waste leaves has been carried out by applying it in pharmaceutical and cosmetic industry. This is an end to end project wherein we have taken care of the residue left after extraction of leaves, by utilizing them as biochar. Biochar has significantly increased the growth of the plants. This work has huge scope in pharmaceutical and cosmetic industry and also will help the countries to meet the targets set up in kyoto protocol via biochar.

India is one of the largest mango producing countries. In this work, the utilization of waste mango leaves for the extraction of important biomolecules and application was performed. For the first time extraction of mangiferin was performed using water as a solvent making it not only a novel and economical extraction method but also a green process.

With the ban on few widely used antidiabetic drugs, there is an urgent requirement for alternative drugs to treat diabetes. Studies revealed that Mangiferin in mango leaves responsible for lowering diabetes.

We conducted tests for anti-oxidant properties and it showed good antioxidant activity, which can be used to protect the skin against ultraviolet radiation. In India, we have not come across any Mangiferin formulation and thus there is a huge scope in developing an anti-aging or anti-diabetic formulation of Mangiferin.

Biochar will help in creating a sustainable technology by acting as a carbon sink with improving the productivity of soil.

Application Results
After extraction, the waste leaves can be used as biochar. Field trial on the efficacy of biochar as a soil amendment studies are in progress to study the effect of biochar on crop yields and soil quality. We have observed faster growth in plants with biochar use. Biochar increases the moisture holding capacity and retains the nutrients of the soil thereby it reduces the amount of chemical fertilizers, pesticides and herbicides that we throw onto soils or use on our plants. The
increased productivity would help farmers and provide increased local and national food security, commerce and export. Apart from the direct use of biochar, indirect use is that if biochar is used globally, CO₂ levels could drop by at least 8 parts per million.

**Result of Field Studies in ICT Matunga, Mumbai garden**

![Image of plant growth comparison](image-url)
1b With Biochar

2a Without Biochar
2b With Biochar