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COMPARATIVE ANALYSIS BY USING GREENER ROUTE ON THE YIELD AND COLOUR OF BIOPLASTIC FROM EDIBLE PRECURSORS

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***Abstract*:** In foreseeable future plastic material will be very different than those that are used today. With increasing requirement of sustainab development, it is need to design manufacturing process by adopting principles of Green Chemistry. The plastic preparation process is carrie out by using green resources for which clean removal is possible. Biggest advantage of biodegradable plastic is its decomposition is achieve when bacteria in environment naturally metabolize the plastic. This paper critically aims at comparative study on quantitative analysis in term ofyield andqualitative analysis in terms of colour brightness by using starting material in the form of starch such as cornflour, rice, Manih esculenta (arrowroot), tapioca sago(sabudana), barnyard millet(bhagar), water chestnut(shingada)etc.

***Keywords*: Bioplastic, biodegradable plastic, starch**

I. INTRODUCTION

Plastics have drastically changed day to day life. The usage is increasing and annual production is likely to exceed. The plastic material has vast potential for exciting applications in near future By considering diverse applications of plastic such as molecular based information storage and transformation, heat and light, conduction and storage of electricity, composite materials unique separation membranes, new forms food processing and packaging health, housing and transportation, and Indeed, plastic plays and will play major role in all aspects of life.

The large number of current and future applications of plastic materials has created a great national need for people specifically trained to carry out research and development in polymer science and engineering. Having achieved the advancement in technology in diverse fields it is responsibility of a researchers how this creation of a man can be disposed easily without harming environment and maintaining sustainable development. With this objective biodegradable plastic is synthesized by using different edible precursor. The term non-biodegradable describes polymers that do not break down into eco-friendly products by biological processes. The plastics which is decomposed into environment friendly products is known as non-biodegradable plastic.Biodegradable. While the words "bioplastic" and "biodegradable plastic" are similar, they different. All bioplastics arenot biodegradable, but in this paper focus is on synthesis of bioplastic which is biodegradable.

II. LITERATURE REVIEW

Biomass, micro-organisms, water and carbon dioxide when decomposed together then biodegradable plastics are obtained.[1] Plastic which is produced from renewable feedstock by microbial action is known as Biodegradable plastics.[2]while the words "bioplastic" and "biodegradable plastic" are different. Packaging, cutlery, crockery, preparing disposable items are some of the applications of bioplastics. [3] Cost and its working is still a big question, but many applications of conventional plastics can be replaced. If supported by rules and regulations restricting the use of conventional plastics, their use can be financially favoured. [4] For example, according to particular law use of bioplastics have been made mandatory in Italy since 2011. [5] Plastics synthesised from natural resources such as animals, plants and micro-organisms are biodegradable plastics. [6]Micro-organism for example Cuprividusnecator is used for the synthesis of bioplastic poly hydroxyl alkanets, PHA. Poly-3-hydroxybutyrate (PHB), polyhydroxyhexaonate (PHH) and polyhydroxyvalerate (PHV) are types of PHAs.When synthesis of PHA is carried out micro-organisms are deprived of some nutrients such as oxygen, phosphorous or nitrogen and excess of carbon is provided. [7] Micro-organisms are ruptured and PHA granules can be obtained. [8]

III. EXPERIMENTALPROCEDURE

Starch is biodegradable in nature. The starting material required for the experiment [9] were starch, water and oil. Bioplastic samples were prepared by heating using 10 gm of starch, 3 ml glycerine and 50 ml water.

In this paper the experimental procedure involved(with slight changes in standard procedure glycerine is replaced by sunflower oil) in synthesis of different types of bioplastic consists of use of raw material that is various starch, oil, water. In order to carry out synthesis of bioplastic from corn, 5 gm of cornflour was heated with 1.5 ml of sunflower oil and 25 ml of water. After heating the product was allowed to cool down and granules of bioplastic was obtained. The same procedure was followed for the synthesis of bioplastic from rice flour, arrowroot, tapioca sago (sabudana), barnyard millet (bhagar) and water chestnut (shingada). In this way different types of bioplastic were synthesised from various starch and its yield was determined and colours were noted for every bioplastic as shown in figures.

IV. OBSERVATION AND RESULT

Fig 1: biopolymer from cornflour

Fig 2: biopolymer from rice flour

Fig 3: biopolymer from maranta arundinacea(arrowroot)

Fig 4: biopolymer from tapioca (sago sabudana)

Fig 5:biopolymer from barnyard millet (bhagar)

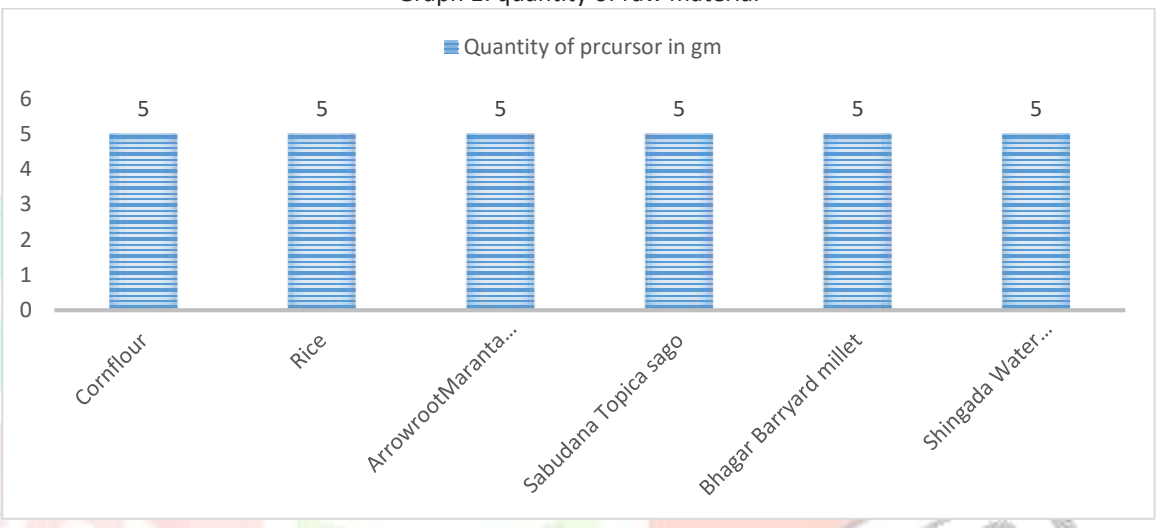
Fig 6:biopolymer from water chestnut (shingada)

V. OBSERVATION TABLE

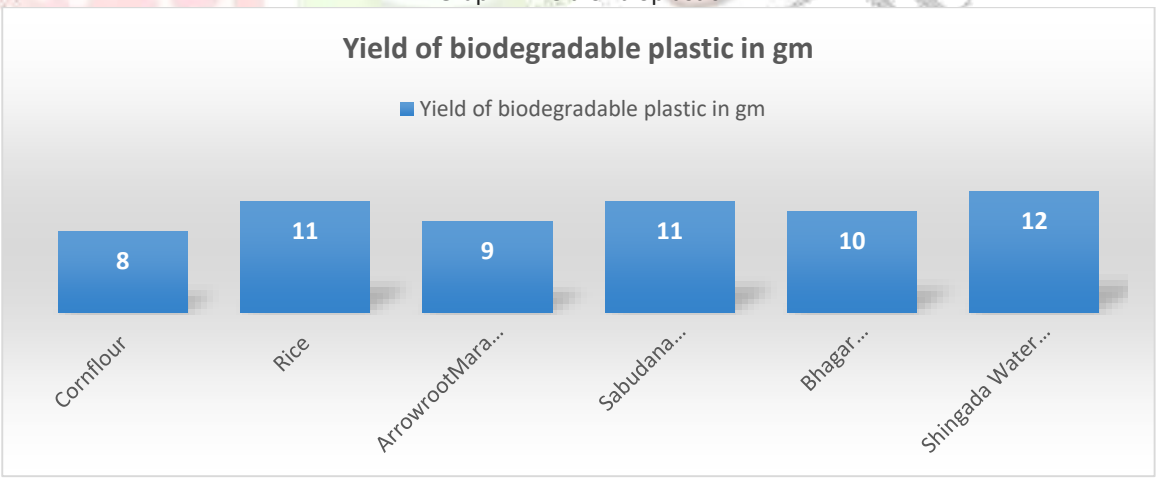
Table1: observation on quantity and colour of biodegradable plastic

Sr.no	Name of precursor	Quantity of precursor	Yield of Biodegradable plastic	Colour
1	Corn flour	5 gm	8 gm	White
2	Rice flour	5 gm	11 gm	Off white
3	Manihot esculenta Arrowroot	5 gm	9 gm	White
4	Tapioca-sago (Sabudana)	5 gm	11 gm	Bright white
5	Barnyard-millet (Bhagar)	5 gm	10 gm	Dark off white
6	Water-chestnut Shingada	5 gm	12 gm	Brownish white

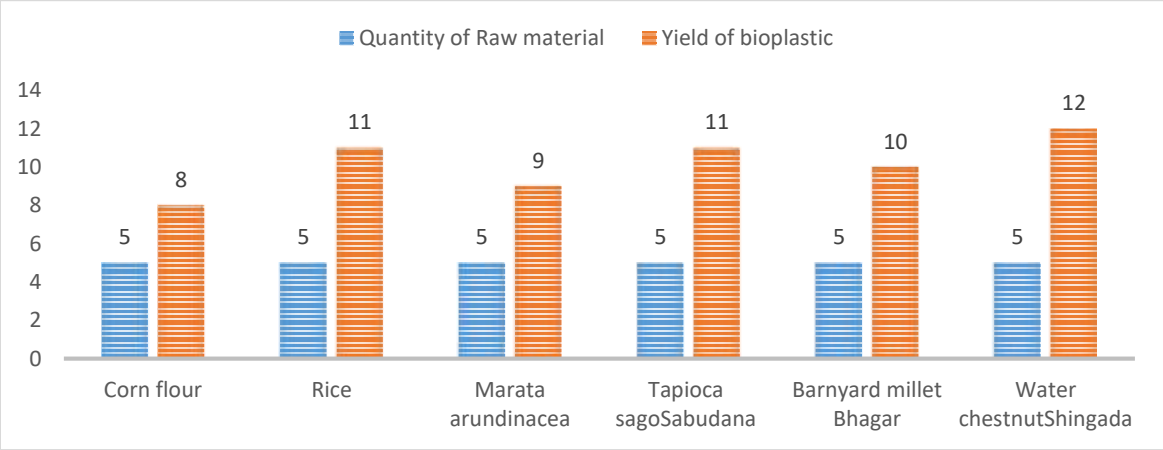
Graph 1: quantity of raw material



Graph 2:Yield of bioplastic



Graph 3: Comparison between quantity of raw material and yield of bioplastic



VI. CONCLUSION

Considering the plastic demand of the current century bioplastic which is easily degradable will be the better choice of material. In this research paper synthesis is carried out with different raw materials by keeping their weight same as 5grams in the preparations of bioplastics. On the basis of observations and results it is concluded that yield of bioplastic is exceeding for the same quantity of 6 different raw materials. On the basis of yield and bright white colour Tapioca sago(sabudana) and rice flour will be of better choice as a raw material. In terms of yield and whitish brown colour, Water chestnut(shingada)is the best choice in terms of raw material. Where as in terms of yield and colour corn flour, Barnyard millet(Bhagar) and Maranta arundinacea(arrowroot) will be also a good choice. Almost all the principles of green chemistry are achieved in above synthesis methods carried out.

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