

**UNIVERSITY GRANT COMMISSION
BAHADURSHAH ZAFAR MARG
NEW DELHI – 110 002**

THE FINAL REPORT OF THE WORK DONE ON THE PROJECT

- 1. Title of the Project:** Characterization & modification of cereal grains for value addition
- 2. NAME AND ADDRESS OF THE PRINCIPAL INVESTIGATOR:** Dr. Raj Sukhwinder Singh, Dept. of Food Science & Technology.
- 3. NAME AND ADDRESS OF THE INSTITUTION:** Guru Nanak Dev University, Amritsar.
- 4. UGC APPROVAL LETTER NO. AND DATE:** F.no.43-379/2014 (SR) dated 11 Sept 2015.
- 5. DATE OF IMPLEMENTATION:** 01/07/2015
- 6. TENURE OF THE PROJECT:** 01/07/2015 to 30/06/2018
- 7. TOTAL GRANT ALLOCATED:** 12,34,000/-
- 8. TOTAL GRANT RECEIVED:**11,68,800/-
- 9. FINAL EXPENDITURE:**11,66,908/-
- 10. TITLE OF THE PROJECT:** Characterization & modification of cereal grains for value addition
- 11. OBJECTIVES OF THE PROJECT:** 1. Physico-chemical characterization of selected cereal grains. 2. To optimize different physical and chemical pretreatment processes required for chemical and enzymatic hydrolysis. Evaluation of different chemical and enzymatic hydrolysis techniques for novel products. 3. Characterization of products produced by chemical and enzymatic techniques. To explore the possible utilization of different products in the industry.
- 12. WHETHER OBJECTIVES WERE ACHIEVED:** YES
- 13. ACHIEVEMENTS FROM THE PROJECT:** ANNEXURE A attached
- 14: SUMMARY OF THE PROJECT:** ANNEXURE B attached
- 15: CONTRIBUTION TO THE SOCIETY:** ANNEXURE C attached
- 16: WHETHER ANY Ph.D ENROLLED/PRODUCED OUT OF THE PROJECT:** No
- 17: NO. OF PUBLICATIONS OUT OF THE PROJECT:** Under process

(PRINCIPAL INVESTIGATOR)

(REGISTRAR)

Annexure-A

ACHIEVEMENTS FROM THR PROJECT : International/National Conferences

Title/subject of paper (s) presented	Subject of conference	Organising Institute	Name of city	From	To	Level
Effect on physicochemical and emulsifying properties of rice due to degree of milling.	25 th ICFOST Food Processing for Sustainable Agriculture and Industry.	Guru Nanak Dev University	Amritsar	10/11/2016	12/11/2016	National
Evaluation of physio-chemical, functional and Antioxidant activity of Roasted wheat flour.	21 st Punjab Science Congress Scientific Advances for inclusive Development and environmental protection	Punjab Agricultural University	Ludhiana	07/02/2018	09/02/2018	National
Effect of degree of milling on the proximate composition and functional properties of full fat and defatted rice bran	21 st Punjab Science Congress Scientific Advances for inclusive Development and environmental protection	Punjab Agricultural University	Ludhiana	07/02/2018	09/02/2018	National
Effect of physio-chemical, functional and Antioxidant activity of Roasted wheat Bran.	ICFS 2018 International conference on Food Security Challenges & Opportunities	Thapar Institute	Patiala	07/12/2018	08/12/2018	International
In-Vitro production and evaluation of wheat and rice syrups from different cultivars of Punjab	ICFS 2018 International conference on Food Security Challenges & Opportunities	Thapar Institute	Patiala	07/12/2018	08/12/2018	International
In-Vitro production and evaluation of corn and barley syrups from different cultivars of Punjab (oral presentation)	ICFS 2018 International conference on Food Security Challenges & Opportunities	Thapar Institute	Patiala	07/12/2018	08/12/2018	International

Paddy waste as a potential source of neutraceutical and nutritional ingredients	ICFS 2018 International conference on Food Security Challenges & Opportunities	Thapar Institute	Patiala	07/12/2018	08/12/2018	Inter-national
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SUMMARY OF THE PROJECT

The flour prepared from wheat and rice of different cultivars germinated at three different temperatures of 15, 18 and 21°C was evaluated for physiochemical properties and protein analysis on SDS PAGE. Ash content of wheat varieties (HD 2967 and PBW 725) and rice varieties (PP 1509 and PR 47) at three different temperatures 15, 18 and 21°C were remain similar. Moisture content of wheat varieties (HD 2967 and PBW 725) and rice varieties (PP 1509 and PR 47) at three different temperatures 15, 18 and 21°C increased slightly with increasing temperatures. Water absorption capacity of wheat varieties (HD 2967 and PBW 725) and rice varieties (PP 1509 and PR 47) at three different temperatures 15, 18 and 21°C is increased slightly with increasing temperatures. Oil absorption capacity of wheat varieties (HD 2967 and PBW 725) and rice varieties (PP 1509 and PR 47) at three different temperatures 15, 18 and 21 °C is decreased slightly with increasing temperatures. Water solubility index of wheat varieties (HD 2967 and PBW 725) and rice varieties (PP 1509 and PR 47) at three different temperatures 15, 18 and 21°C is increased slightly with increasing temperatures. The L* values of wheat varieties, HD-2967 at 15°C was lowest as they developed some brown color whereas for PBW 725 L* was highest at 15°C as they developed lighter color, similarly The L* values of rice varieties, PP 1509 and PR 47 is highest at 21°C which show they are more lighter at higher temperatures. Temperatures variation did not showed any variation on protein bands on SDS PAGE which concluded that temperature variations not affect on protein during germination as bands on different temperature does not show any variations on gel. ANOVA showed significant effect of treatment of different germination temperatures on variety on each parameters as ash, moisture, WAC, OAC, WSI and hunter color. However effect of variety is higher than treatment and interactions.

Rice can be used as a source for preparation of syrup sweeteners. Various physico chemical parameters were studied for the syrups prepared from five different varieties and it was indicated that the syrup obtained from PR 124 rice cultivar showed good results. PR 124 had highest amount of reducing sugars and total soluble sugars while the PUSA 1509 was having least amount of reducing sugars and total soluble sugars as this is having fine and slender kernels. Also, the syrup prepared from PR 124 variety was found to be least turbid and lighter in colour. PR 47 was more turbid and cloudy as compared to other syrups which may be due to the higher mineral content and proteins. Results of sensory evaluation also indicated the more likeness for the syrup prepared from PR 124. It was concluded that rice can be used as a good source for production of sweet syrups. Out of the five rice cultivars used for preparation of syrup, PR 124 variety is most suitable.

Syrups were prepared by malting and mashing of different wheat cultivars. Various physicochemical tests were performed on the prepared syrups. Highest TSS was found in the wort of wheat cultivar PBW-725 which points towards highest modification of its starch by enzymes during malting and mashing. The syrup obtained from wheat cultivar PBW-343 had the lightest colour but lowest amount of reducing sugars. The syrup prepared from HD-3086 had highest amount of reducing sugars and least viscosity and least turbidity but had dark appearance and had least ratings during sensory evaluation due to a dark appearance and off after taste. Syrup prepared from malted flour of PBW-725 had highest turbidity which indicates higher mineral content; but it had highest acceptability during sensory evaluation.

The current study concluded that good quality syrups can be prepared from wheat without the need of exogenous enzymes, by benefiting from the enzymes naturally present in the wheat grains which can be activated by malting process. Thus, these syrups would be more economical than those prepared by exogenous addition of enzymes.

Further research can be carried out for partial or complete replacement of sucrose by rice syrup in preparation of various food stuffs. There is a great scope in wheat syrup industry in India as wheat is the highest produced cereal grain. It will also take some burden off the sugar industry which relies mainly on sugarcane for the production of natural sweeteners.

CONTRIBUTION TO THE SOCIETY

The project was planned for the proper utilization of cereal grains to avoid the wastage and losses during storage. The cereals rice, wheat, corn, barley, different varieties available in Punjab were malted under different conditions and finally the Syrups were manufactured from these cultivars. The syrups can be utilized in different ways for different applications, which will enhance the utilization of the cereals. This will avoid wastage and enhance utilization for varied functions, which will finally enhanced the economy of state as well as farmer.