THE RICE-ING COLORS: **UNRAVELLING THE GENETIC DIVERSITY OF PIGMENTED RICE AND THEIR ANTIDIABETIC AND ANTI-CANCER PROPERTIES**

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HIGHLIGHTS



Pigmented rice exhibits anti-colon cancer and anti-diabetic properties.



The candidate genes related to secondary metabolites and glycemic index were identified based on GWAS.



Models showed good accuracy in predicting the nutritional properties of pigmented rice.

INTRODUCTION

RESULTS

In **developing countries**, many low income families rely on staple food like milled rice which often lacks critical nutrients. Thus, there is a need to look for rice with abundant nutrients.



In **developed countries**, there is an increasing prevalence of diabetes and cancer.

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Candidate genes for low glycemic index properties



Rare gene bank accessions (red rice varieties) possessing genetic variants in **bHLH and IPT5 genes** were identified through haplotype enrichment. Elevated catechin levels in red rice has been related with the low glycemic index lines.

Flavonols and anthocyanins classify colored rice





With increasing threats to public health, we need to introduce rice with enhanced nutritional properties and several health benefits.

METHODS

Large diversity of pigmented rice (n=1000) from different countries were extracted and subjected to various analyses.



Targeted and Untargeted metabolomics were employed to determine the compounds. Spectrophotometric techniques were used to quantify the total phenolics, flavonoids, and anthocyanins.

GWAS analysis on red rice samples were performed to identify genetic regions related to glycemic index.

MG - Matured Grains, LB - Light Brown, P - Purple, R - Red, VP - Variable Purple

Metabolites linked with anti-colon cancer activity



LB - Light Brown, P - Purple, R - Red, VP - Variable Purple

Many variable purple rice exhibits effective anti-colon cancer activity.

- DSPC network revealed that anti-colon cancer property is linked
- with anthocyanins, 3,4-dihydroxycinnamic acids, and p-coumaroyl glucoside accross rice types.

Models to predict dietary benefits of colored rice

All extracts were tested for their antioxidant activity and antiproliferative activity against colon cancer cells.



The pericarp color can mostly predict the anthocyanins content owing to the chromopores in their structures. (Other models are not shown).

Anti-

cancer

Anti-

oxidant

Anti-

diabetic

CONCLUSION

- GWAS coupled with metabolite data has provided new insights and novel genes related to the dietary benefits, such as anti-cancer and anti-diabetic properties.
- **7** The anti-colon cancer activity of the colored rice lines was linked with hydroxycinnamic acids and anthocyanins. Much variable purple rice demonstrated effective anti-colon cancer properties.
- **3** Flavonols and anthocyanins can classify rice based on their color through modeling.

