

Formulation, Fermentation, and Quality Assessment of Dasiffron: A Functional wine derived from Dates, Raisins, and Saffron

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Abstract

In this study, a new fruit wine (DASIFFRON) was developed and characterized based on dates (*Phoenix dactylifera*), dried raisins (*Vitis vinifera*), and saffron (*Crocus sativus*). After extraction of the high-quality juice using thermovinification, cold settling, and controlled alcoholic fermentation (*Saccharomyces cerevisiae*), the juice of both dates and raisins was mixed in a 2:1 ratio (dates: raisins) followed alcoholic fermentation in closed environment with frequent analyses of °Brix, pH and acidity during ongoing fermentation to assist in optimal wine quality. Once fermentation was complete saffron was added to provide flavor and aroma. The product had 11% (v/v) alcohol level, 7°Brix, pH of 3.25, and a total acidity of 5.5g/L; sensory evaluation of this final product indicated a desirable balance of sweet and sour, perceived dates flavor, and mild aroma of cloves and saffron. The ability to formulate DASIFFRON shows possibility of adding dry fruits and spices in innovative wine products which not only add nutritional value but also have unique sensory characteristics.

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Introduction

Food products of natural origin regaining popularity not only as culinary in gradients but also as supplementary health benefiting and disease preventing agents. These include date palm (*Phoenix dactylifera*), raisins (dried grapes), and saffron (*Crocus sativus*), which are all nutrient-dense, antioxidant-rich, and bioactive-rich components of food that can contribute positively to our health and well-being. Although these foods have been traditionally consumed in many cultures for centuries, a growing number of studies have begun to examine some of these benefits and properties of these functional foods for digestive health, glucose modulation, cardiovascular and neurological functions, and anti-inflammatory and anticancer properties.

Believed to have originated in the Middle East and extensively cultivated in dry geographical areas, the date palm is a nutritional miracle with its natural sugars, dietary fiber, minerals, and high levels of antioxidants. Dates are not only the part of many traditional diet regime, but also have the auspicious therapeutic potentiality to counter the chronic diseases like diabetes and kidney disorders.

Likewise, raisins, which are produced by drying grapes, are appreciated for their energy density, fiber and micronutrient supply. They are good for digestion, bone health, and heart function, and give you a quick burst of energy, making them an easy and healthy snack!

Saffron, the dried stigma of the *crocus sativus* flower, is one of the most expensive spices on earth. Saffron is not only a universal spice, but also a vivid dye and plant full of phytochemicals like Crocin and Safranal, which have antioxidant, antidepressant, and anti-inflammatory properties. The objective of this study was to investigate and compare the nutritional profile and beneficial properties of these three natural products in terms of their potential role in enhancing health and in preventing chronic diseases. The scientific foundation explains their traditional uses, which can further support their potential use in modern nutrition and medicine.

Methodology and Material

Materials

The below raw materials and chemical reagents were used in preparation and fermentation. *Phoenix dactylifera* (Date

Palm) Dried grapes (*Vitis vinifera*) Saffron (*Crocus sativus*) Yeast (*Saccharomyces cerevisiae*) Distilled water

Equipments and Laboratory Essentials

All experimental procedures were conducted using the following instruments/apparatus:

5Land2LGlassjars Thermometer Hydrometer Refractometer pH meter Weighing balance Measuring cylinder Buffer solution 0.1NNaOHsolution Burette Ebulliometer Heating coil Titration assembly KMS (Potassium metabisulphite) Diammonium phosphate (DAP) Tartaric acid Siphon pipe Muslin cloth Empty glass bottles (750ml) Air-conditioned (AC) room Refrigerator Laboratory-grade glassware

Process Flow Diagram

Following are the steps showing the process of preparation:

Raw Material Processing:

Dates: Wash → Seed removal → Mill → Cool →

Thermovinification

Raisins: → Washing → Stem

removal → Grinding → Cooling → Thermovinification

Blending: Blended 2:1 date and raisin extracts

Cold Settling: 48 hours of fridge time Juice analysis:

Determination and adjustment of °Brix, pH, and titratable acidity. Yeast inoculation: *Saccharomyces cerevisiae* active addition Alcoholic Fermentation: 10days with regular checks

Cold Stabilisation (I): After fermentation, 48hours at ~20°C

Racking I: First Suspended Sediments Removal Cold

Stabilization (II): 15 Days of Ongoing Stabilization

Racking II: Clearing — Light lees Opt-out

Final Analysis: Ethanol, pH, Acidity, Residual Sugar

Bottling: Bottling in a sanitized condition with addition of KMS for preservation

Methodology

Day1 – Preparation of Must

We washed 3kg of date's and 2kg of raisins well. Remove seeds from dates and stems from raisins. Method: After grinding fruit with distilled water, we obtained slurries. The slurries were then heated at ~50°C for 15–20min while stirring to facilitate the extraction. Previously to cooling, first physicochemical parameters were measured:

Date Juice: Brix 18.5, pH 5.03, Temperature 21°C Raisin juice: 16°Brix, pH 3.79 Temp 21°C

Tartaric acid was employed to lower the pH of date juice from 5.03 to 4.34 with 2g. Day 2 – Cold Settling

The juices were extracted and refrigerated for 48h to allow these domination. Day 3 – Yeast Inoculation

The bulk juice volumes were measured at the end of settling were 3.9 L (date) and 4.2 L (raisin). Adding 50g sugar (in 100ml water) to the raisin juice to increase the sugar amount. This activated yeast was mixed in lukewarm water (45°C):

2.2g for date juice

2.6g for raisin juice

Portions of each juice were inoculated with the activated *Saccharomyces cerevisiae*. To facilitate fermentation, 0.4 g DAP (0.1 g/L) was also added to each.

Days 4 through 11—Fermentation with Alcohol

The fermentation was 10 days at room temperature. These variables were monitored every day: °Brix, pH and temperature. Bubbling and bubbling meant that fermentation was in full swing. A second dose of 0.4 g DAP was administered on Day 10.

Days 12–13 – Cold Stabilization I

The stabilized fermented juice was cooled at ~2°C in a refrigerator for 48 hours to enhance sedimentation and clarity.

Day 14 – I & Saffron Racking

We racked clear wine through a siphon pipe and muslin. Saffron was added for aroma and sensory purpose

Cold Stabilization II (Days 15–20)

This saffron product was refrigerated another 6 days in order to stabilize (in an attempt to homogenize flavour components).

Graph II: LOD (mg/L) on the y-axis against All-RH (mg on the x-axis), for a number of runs at the final test-rack function (N=x).

The racking was performed second time to remove the remaining lees. Ethanol content was assessed by Ebulliometer and final parameters (pH, °Brix, total acidity, volatile acidity and free SO₂).

Day 22 – Bottling

The clarified wine was separately bottle din disinfected glass bottles of 750ml vol. To achieve microbial stability and shelf-life all the bottles received a dose of KMS.

Results and Conclusion

This means that dates do pack some nutrients and health benefits. High in dietary fibre, antioxidants, necessary minerals, and plant-based bioactive compounds may help with digestion, brain function, heart function, and fertility.

The present study investigated about the preparation and characterization of new fruit wine named "DASIFFRON" derived from dates, raisins and saffron. This was a useful process on understanding the science and practical use of winemaking with dried fruits and natural insoluble flavouring agents.

Process Outcomes

Juice Extraction and Processing:

The hardest step faced was digesting healthy juice from dried fruits. A 2:1 ratio of dates and raisins was the removing fied and cold settled to produce the clear, nutrient packed juice base.

Fermentation Dynamics:

During fermentation, °Brix readings showed a progressive decrease, in agreement with the decrease of sugars and a corresponding increase of ethanol concentration. The fermentation was well-facilitated through the use of DAP supplementation of *Saccharomyces cerevisiae*.

Final Wine Parameters:

Some of the final Ducasse DASIFFRON wine in physicochemical properties were as follows:

Alcohol content: 11% (v/v) Residual sugars: 7°Brix pH: 3.25

Total acidity: 5.5g/L Sensory Evaluation:

When we tasted the wine, it tasted relatively balanced: slightly sweet and light sourness. The flavour was primarily notes of date fruit, with gentler undertones from clove and saffron that added to its unique smell and palatability.

Discussion

We gained insights from the challenges and opportunities of using dried fruits for alcoholic beverage production as DASIFFRON wine was developed from dates, raisins and saffron. This paper showed that fermented juices from thicker, low water content fruits could yield better abilities in addressing their initial deficiencies in juice extraction; this combined with winemaking practices like the removing fiction, cold settling, and other adjustments with the juice prior to fermentation.

The decreasing° Brix values were consistent with the increasing ethanol concentrations during fermentation, which substantiated the successful fermentation activity of *S. cerevisiae*. The strategic implementation of DAP supplementation further enhanced the yeast efficiency at critical time points, avoiding sluggish fermentation and allowing for a full fermentative sugar conversion.

Specifically, the modifications of juice properties, particularly pH and sugar concentration, were necessary to support yeast activity and to provide the final product with microbial stability. The resulting final pH of 3.25 and acidity of 5.5 g/L of acidity fall within an acceptable range for fruit wines, aiding in the balance of flavour, microbial safety, and stability during shelf-life of the product.

Saffron brought interesting aroma characteristics in the second fermentation phase, but it did not disrupt the originality of the natural profiles of dates and raisins. This indicated the potential for using aromatic herbs and spices in the production of fruit wine to improve sensory characteristics and provide functional value.

DASIFFRON wine had a distinctive sensory profile of natural sweetness (with dates and raisins), low astringency (but high acidity), and the presence of a pleasant clove-like, saffron aroma. All of these features in dictate a high likelihood of consumer acceptance, and is therefore particular to a market in need of novelty, health, and naturalness in their beverage consumptions.

DASIFFRON wine provides an alternative taste and nutrients than traditional grape wines. The findings suggest that the wine may have other health benefits not seen with regular wines because dates and raisin are so high in dietary fibre, potassium, magnesium, and antioxidants especially phenolic compounds and even other bioactive constituents.

Conclusion

These findings indicate that dried fruits like dates and raisins, paired with saffron, can be used as functional ingredients in wine production; the efficient production of DASIFFRON wine supports this work. Therefore, end product is not only able to provide good sensory and chemical properties but also might become a source of health-beneficial nutrients. In conclusion, this study provides a reproducible and efficient protocol to obtain a high-quality fruit-based wine and open a new venue toward the development of new Nutraceutical beverages.

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