

Production and Acceptability of Jam Produced from Kiwi Fruit and Cucumber [†]

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Abstract: Fruits are an essential part of a healthy lifestyle, providing the body with the necessary nutrients and helping to prevent illness. Recognizing the importance of fruits, our study aimed to create a unique and nutritious mixed fruit jam using the delightful combination of kiwi and cucumber. We chose kiwi and cucumber for this experiment due to their exceptional nutritional value. Kiwi is rich in vitamin C, vitamin K, and dietary fiber, while cucumber is hydrating and contains vitamins A, C, and K. Combining these two fruits not only adds a refreshing flavor but also enhances the nutritional profile of the jam. In our experiment, we tested different ratios of kiwi and cucumber, including 100% kiwi (control), 50% kiwi and 50% cucumber, 70% kiwi and 30% cucumber, and 30% kiwi and 70% cucumber. To improve the texture and preservation of the jam, we added commercial pectin, sodium benzoate, and citric acid. Through comprehensive analysis, we found that the jam made with a 50%:50% kiwi ratio (T₁) stood out regarding its physicochemical properties. It had higher levels of titratable acidity, total soluble solids, moisture, pH, and ascorbic acid while having a lower proportion of total sugar. These attributes contribute to a well-rounded nutritional profile, making it an excellent choice for individuals seeking a healthy option. To ensure the jam's sensory appeal, we conducted sensory assessments evaluating its taste, scent, texture, and overall acceptance. The T₁ jam received the highest scores in all sensory categories, indicating that it was the most preferred option among the participants. Its vibrant green color, with L*, a*, and b* values of 32.41, -2.29, and 9.51 respectively, adds to the overall sensory experience and entices consumers to indulge in its goodness. In conclusion, our study highlights the nutritional excellence and sensory delight of the kiwi-based jam, particularly the T₁ variant. By combining the goodness of kiwi and cucumber, we have created a jam that not only satisfies taste buds but also nourishes the body. It's an excellent choice for individuals of all ages looking for a healthy and enjoyable spread. So spread this fruity goodness on your toast, and savor the benefits.

Keywords: kiwi fruit; mixed fruit jam. cucumber jam

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1. Introduction

Fruits should be eaten on a regular basis to maintain a healthy lifestyle and avoid disease. Fruits are high in beneficial nutrients and help us meet our daily dietary requirements. Cucumber (*Cucumis sativus*) is a popular and significant Cucurbitaceae vegetable. It is said to have been one of the first vegetables grown by man 5000 years ago [1]. Cucumbers have a high medicinal potential. They are high in vitamin C, manganese, phytochemicals (alkaloids, phlorotannin, flavonoids, saponins, steroids, and tannins), and beta-carotene. Cucumbers possess cytotoxic, and antacid, antibacterial, antifungal, but carminative properties, with ample amounts of fat, cholesterol water, few calories, and sodium [2]. Cucumbers are widely farmed in Europe, with yearly output accounting for around 26.77% of total vegetable production. Cucumber, despite being a rich source of vital

nutrients and bioactive chemicals, has been employed in therapeutic medical and beauty culture purposes since ancient times [3].

Because of its great nutritional and therapeutic value, as well as its multiple health advantages, kiwifruit is one of the most popular fruits on the international market. It is native to China and was introduced to New Zealand in the early nineteenth century as one of the most recent fruit crops to achieve international attention and commercial significance. China is now the world's biggest kiwifruit grower, with an annual output of about 1.056 million metric tons (38.7% of global production) and an estimated planting area of 180,00 hectares (59% of total global planting area). In addition to fresh consumption, yogurt, jelly, kiwifruit juice, vinegar, jam and wine are also popular kiwifruit products. Although jam and dried kiwifruit slices had extra mineral components, kiwifruit, vinegar, juice, and wine were shown to be high in vitamin C and polyphenols, with substantial biological activity. Because of their great perishability, kiwi fruits have a very short shelf life. Jams exposed to a thermal technique, such as pasteurization, are a potential choice for increasing shelf life and storage term [4].

Because both fruits have a delicate texture, even little temperature changes result in degeneration and waste. This initiative was started to employ perishable fruits in the form of jam due to a lack of other preservation capabilities to maintain the product in raw form.

2. Materials and Methods

2.1. Procurement of Raw Material

Fresh, mature, and healthy cucumbers and kiwi fruits were grabbed from the local market of Faisalabad and transported in corrugated soft board cartons to the UAF Faisalabad's National Institute of Food Science and Technology. Pectin, citric acid, sugar, sodium benzoate, and other necessary equipment such as glass bottles, blender, saucepan, spoons, weight scale, stirrers, and so on were used to prepare jam.

2.2. Preparation of Raw Material

After washing and cleaning of fruits, pulping was done by using a blender until a fine puree was obtained. Then pulps were stored at refrigerator temperature for further processes.

2.3. Preparation of Jam

According to the jam, modest alterations were done. Each sample formulation's fruit purees were collected, poured into a big, clean stainless pot, and cooked for 25 min at a temperature of 120 °C using a thermometer. Pectin, sodium benzoate, and citric acid were added as the pulps began to boil. (Which had previously been mixed with warm water to dissolve it). The jam was then allowed to cool to 40 degrees Celsius before being placed in sterilized jars and promptly sealed. Before analyzing the jam, it was placed in a clean container and chilled.



| Treatment plan | | |
|----------------|-----------------------|------------------|
| Treatments | Cucumber Fruit Pulp % | Kiwi Fruit Pulp% |
| T ₀ | 100% | 0% |
| T ₁ | 50% | 50% |
| T ₂ | 30% | 70% |
| T ₃ | 70% | 30% |

3. Results and Discussions

The samples were subjected to physicochemical examination, reducing and non-reducing sugar ratio, color measurements, sensory evaluation, and vitamin constituent analysis. The T₁ sample with a 50%:50% fruit pulp mixture yielded the greatest results.

The pH was measured by using pH meter which was 3.6. The TSS was measured in degrees Brix using a hand refractometer at room temperature which was 67 degrees. Acidity percentage was 1.88% which was measured by digital acidity meter. Titration with a 2,6-dichlorophenolindophenol sodium salt solution was used to assess the ascorbic acid level. This came to 38.54 mg. The jam generated was light green, and the color measures L*, a*, and b* were 32.41, -2.29, and 9.51, respectively. The 50%:50% T₁ mix also received higher sensory scores on a 9-point hedonic scale, which assess the appearance, texture, taste, aroma, and overall acceptability. The total sugar, reducing and non-reducing sugar values were 14.3%, 13.2% and 16.5% respectively.

When cucumber and kiwi fruit were combined for jam production, the physicochemical, nutritional, textural, and sensory features increased when compared to the kiwi fruit-only sample.

4. Sustainability Importance and Future Research Directions

By finding the optimal fruit pulp mixture and achieving higher sensory scores, your study contributes to the economic viability of jam production. Additionally, the use of a combination of cucumber and kiwi fruit for jam production can have positive sustainability implications by utilizing different fruits and diversifying the agricultural industry. For future research directions, you could explore the market potential and consumer preferences for this innovative jam product. Additionally, investigating the environmental impact of this fruit combination on resource usage and waste management could provide valuable insights for sustainable food production.

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