

TO INVESTIGATE THE ANTIOXIDANTS IN FRUIT JUICE

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ABSTRACT

The main objectives of this project is to find out the activity of antioxidants in the different types of fruit juices, and under which conditions do the juices retain their antioxidants the best, using DPPH (2, 2-diphenyl-1-picrylhydrazyl). Lime juice exhibited the most potent antioxidant activity, followed by orange juice. Overall, this study characterizes the relative antioxidant potency of lime, orange, blackcurrant, strawberry and blueberry juices. In this project, we have tested various fruit juices like orange, lime and blackcurrant.

INTRODUCTION

An antioxidant is a molecule capable of protecting the human body from the effects of the oxidation of other molecules. Oxidation reactions can produce free radicals (molecules produced when the body breaks down food, or by environmental exposures like radiation and tobacco smoke), which starts chain reactions that can cause damage or death to the cell. Antioxidants terminate these chain reactions by removing free radical intermediates, and inhibit other oxidation reactions, by being oxidized. Antioxidants may also act as pro-oxidants. For instance, vitamin C has antioxidant activity when it reduces oxidizing substances such as hydrogen peroxide. Vitamin C exerts its effects by oxidizing polypeptides and appears to have a mostly antioxidant action in the human body.

METHODOLOGY

10 μ l of fresh orange juice is pipetted into 5 wells of the 96-well plate. Repeat step 1 for the other juices. 10 μ l of water is pipetted into another 8 wells, which will be set as the control of the experiment. 190 μ l of DPPH is added into each well containing the juices and control. Let the Tecan Infinite 200 machine read the 96-well plate, to determine the concentration of antioxidants in each juice, thirty minutes after the start of the reaction. Results are recorded and by using the formula = $(1 - (\text{juice1}/\text{AVERAGE control})) * 100\%$ to find the percentage activation of the juice. (* stands for multiply).

RESULTS

FIGURE 1: According to previously published results, fresh blueberry juice has the highest antioxidant activity, followed by lime and orange juice. However from our graph, it can be seen that Lime Juice (hand squeezed) has the highest antioxidant level, followed by fresh orange juice (hand squeezed), F&N blackcurrant juice with aloe vera pulps, blueberry jam juice, Ribena, and finally the strawberry jam juice. Blueberry jam juice should contain more antioxidant than shown from our results. As such, it could be due to the fact that upon processing the jam, certain preservatives could have been added, hence decreasing its antioxidant activity. Moreover, it was not hand squeezed and has been diluted with water in the ratio of 1 unit jam to 7 units water, allowing the antioxidant level to decrease further.

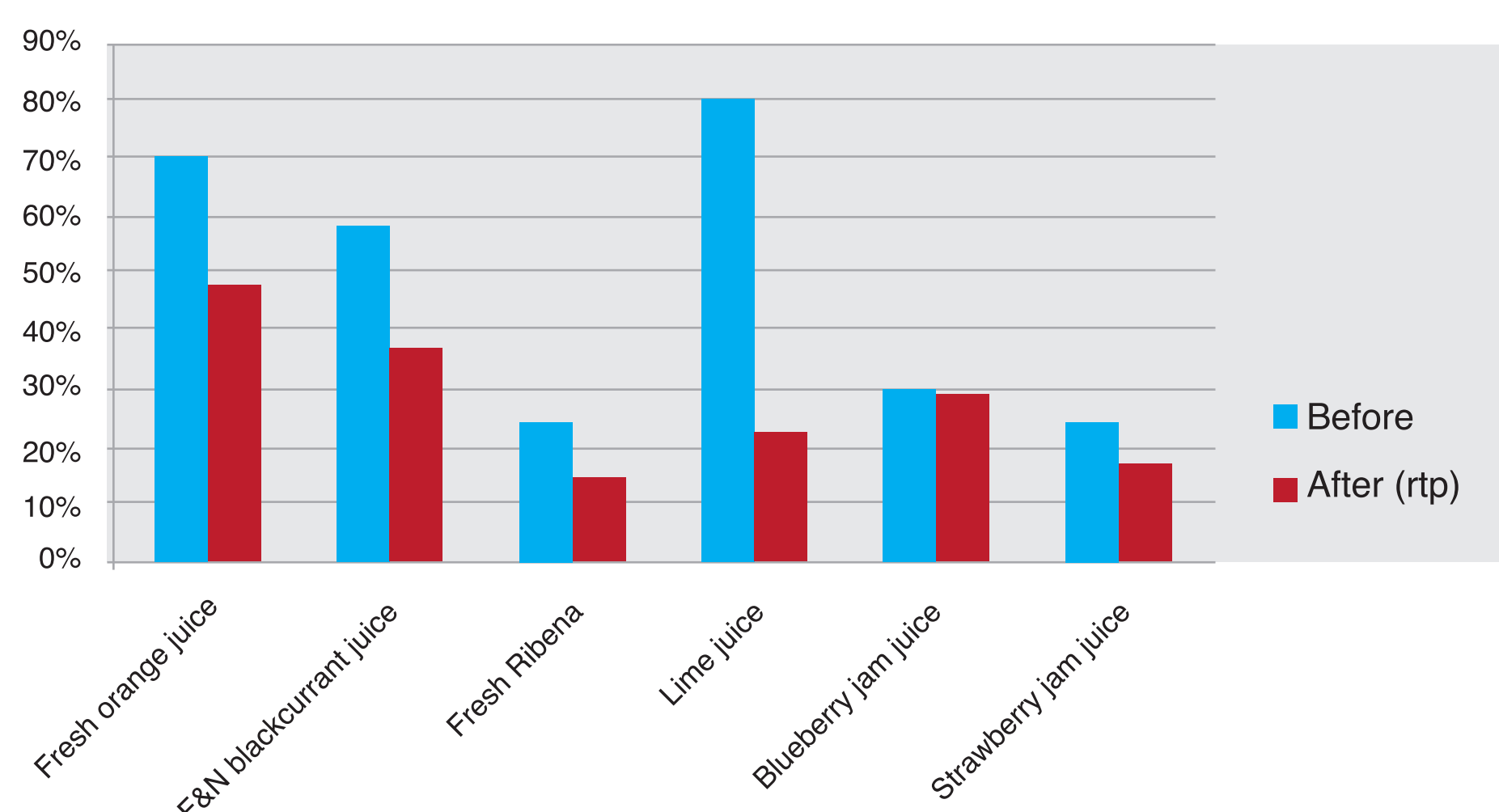


FIGURE 1: Level of antioxidants (before and after 6 months) in the different types of fruit juices

FIGURE 2: There is generally a decreasing trend of percentage activation of the fruit juices. This proves that over time, antioxidant activation of fruit juices will be retarded; hence they should be consumed once opened to prevent the loss of antioxidants.

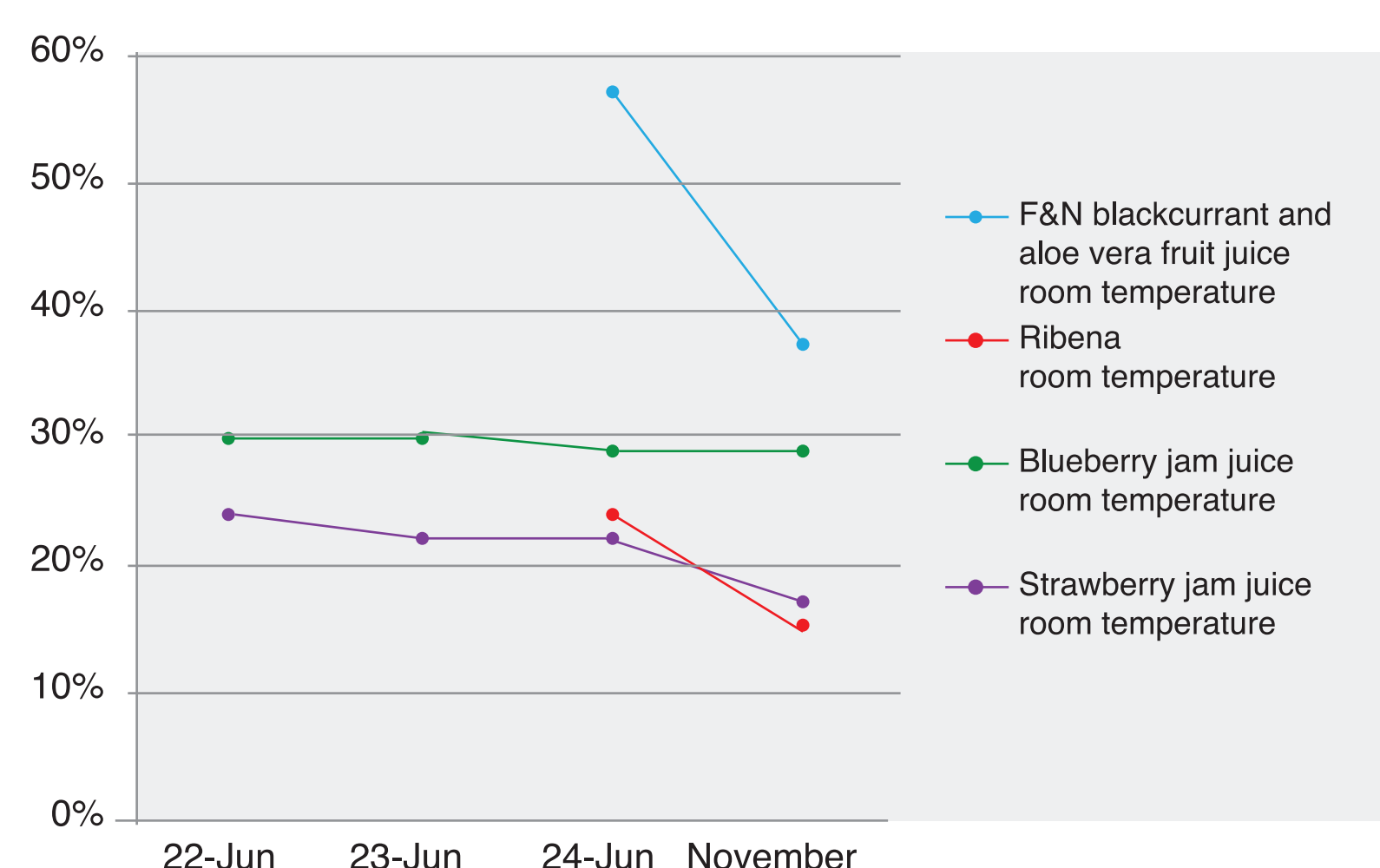


FIGURE 2: General trend of activation of antioxidants

FIGURE 3: From this result, we can conclude that the best method of preserving fruit juices for a short term period is at room temperature, while to preserve the juices for a long term period is at -20°C . Storing fruit juices at 4°C seems to be the worst method of preservation, which is also proven by the data for fresh orange juices.

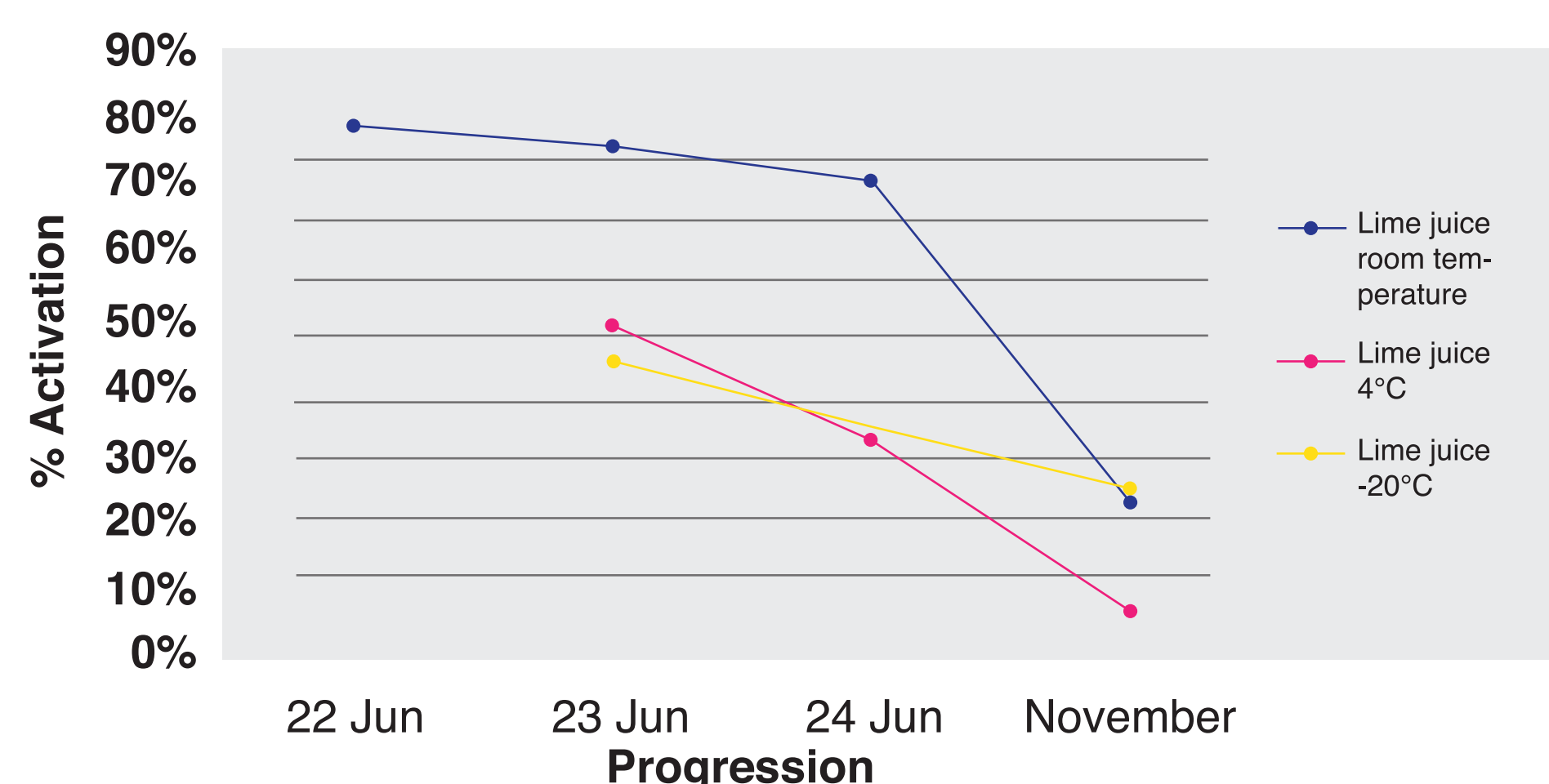


FIGURE 3: Under which conditions do the lime juices retain its antioxidant the best

CONCLUSION

As shown from the data, juices stored in room temperature contains the most antioxidant in it for the first few days. As such, juices stored in room temperature should be consumed within a few days upon opening. Although the juices stored at -20°C do not contain as much antioxidant as compared to those stored in room temperature, it slows down the decrease in the antioxidant content. Juices stored in 4°C do not have a drastic drop in the antioxidant content as compared to those stored in room temperature. Hence, to keep the freshness of the juices, it is advised to keep them in 4°C .