

**ADVANCED SUBSIDIARY GCE**

**APPLIED SCIENCE**

Cells and Molecules

**PLAN FOR AN INVESTIGATION**

**INSERT**

**G623/INSERT**

For issue on or after: **TUESDAY 17 NOVEMBER 2009**



**INFORMATION FOR CANDIDATES**

- The abstracts on pages 2 and 3 of this insert are to give you some background that you might find helpful in planning for the task that follows. Not all the information included will be directly relevant and you are expected to select the information that is relevant to the task.
- This document consists of **4** pages. Any blank pages are indicated.

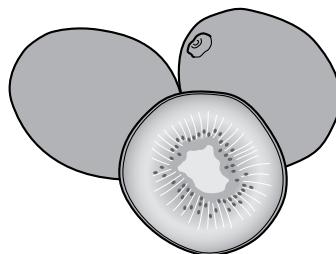
## 'A Golden Opportunity'

Kiwi fruit is the edible fruit of *Actinidia deliciosa*, and hybrids between this species and others in the genus *Actinidia*.

This fruit consists of a hairy, brown peel containing green flesh, with white pulp in the centre surrounded by black, edible seeds. The fruit has a sweet taste, similar to a mixture of banana, pineapple and strawberry. Kiwi fruits are rich in many vitamins, minerals and flavonoids, such as vitamin C, potassium and beta-carotene. Flavonoids help protect cells from oxidative damage, and are therefore considered very helpful in protecting DNA from mutations and damage.

Studies in Italy, performed on 6- to 7-year-old children, have also demonstrated additional health benefits to the respiratory tract. In particular, children that were fed 5-7 portions of citrus and kiwi fruits a week had 44% less probability of wheezing compared to children eating less than one portion a week.

Shortness of breath was reduced by 32%, night time cough by 27%, severe wheeze by 41%, chronic cough by 25%, and runny nose by 28%. It has been suggested that there is a close correlation between these results and the enhanced vitamin C and potassium levels within the fruit.



**Sliced kiwi fruits**

Studies have proven that kiwi fruits are useful in improving conditions of asthmatic children, and in decreasing the probability of colon cancer by providing a large quantity of dietary fibre (3.4 g per 100 g fruit).

However, kiwi fruit can produce allergic reactions in some individuals since the fruit contains the protein-digesting enzyme 'actinidin'. The most common **symptoms** include itching of the mouth, lips and palate, but can range to a more severe level such as wheezing or collapsing.

**'Fruitful Research'**

New Zealand's economy is highly dependent on agricultural and horticultural exports such as kiwi fruit. The country has built up a thriving research and development sector attached to the industry. The country's biotechnology industry is blossoming, with a broad spectrum of agricultural-based research. One of the products of this research is the golden kiwi, *Actinidia Chinensis*. This is a variety of kiwi fruit which has been bred to have a smooth skin with few bristles, yellow rather than green flesh and a higher vitamin C content.

<http://www.newscientist.com/article/mg19025512.300-new-zealands-blossoming-biotech-sector.html>

**'DCPIP'**

**2,6-dichlorophenolindophenol (DCPIP)** is a blue chemical compound which can be used to measure respiration rates in tissue extracts. DCPIP is a substance which accepts hydrogen atoms and in doing so, changes colour. It is blue in its oxidised form and colourless when it is reduced.

DCPIP is commonly used as an indicator for ascorbic acid (vitamin C). If vitamin C , which is a good reducing agent, is present the blue dye is reduced to a colourless compound.



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