Strawberry: for swat. nutritional value: we know that

Business, Marketing

STRAWBERRY: Strawberry is a non-climacteric fruit that usually takes up to 30 days toachieve full size and maturity. This time is highly dependent on light, temperature, soil composition, and other conditions of cultivation. Strawberries areno exception to this rule; in addition to antioxidants, they have many othernutrients, vitamins, and minerals that contribute to overall health. Theseinclude folate, potassium, manganese, dietary fibre, and magnesium. It is alsoextremely high in vitamin C. Kingdom: Plantae (unranked): Angiosperms Order: Rosales Family: Rosaceae Subfamily: Rosoideae Genus: Fragaria Species: ananassa Thegarden strawberry was first bred inBrittany, France, in the 1750s via a cross of Fragaria virginiana from eastern North America and Fragaria chiloensis, which was broughtfrom Chile in 1714.

Cultivars of Fragaria× ananassa have replaced, in commercial production, the woodland strawberry(Fragaria vesca), which was the firststrawberry species cultivated in the early 17th century. Thestrawberry is not, from a botanical point of view, a berry. Technically, it isan aggregate accessory fruit, meaning that the fleshy part is derived not fromthe plant’s ovaries but from the receptacle that holds the ovaries. Eachapparent “ seed” (achene) on the outside of the fruit is one of theovaries of the flower, with a seed inside itSince2006, 74 new strawberry plant cultivars have been released in the UnitedStates. This research is a portion of a larger U. S.

Department ofAgriculture-funded project called ” RosBREED: Enabling marker-assisted breeding in Rosaceae.” The overall goal of RosBREEDis to facilitate the use of DNA marker-assisted breeding in Rosaceae fruitcrops to improve. VARIETIES OF STRAWBERRY: Fragaria vescafor wild strawberry, and

Fragariaorientalis for strawberries found in Siberia. Strawberries grow in bushesand are delicious seasonal fruits that also boost your health. Strawberries areoften associated as a European fruit; however, they are popular throughout theworld. Since 1988 to 1998, many new varities of strawberrieshave being released for improved fruit quality which includes Ciflorette in 1998, Cirafine in 2001 and Charlotte in 2004. InPakistan strawberry is consumed infresh form as well as in processed form for making squashes, jams and jellieswhich may use throughout the year. Main varieties of strawberry which arecultivated in Pakistan are Douglas and Toro appropriate for southern areas ofPakistan whereas Chandler, Cruz Pocahontas and Tufts are suitable for Islamabadand Honeyo, Chandler, Gorella and Corona are recommended for Swat.

NUTRITIONAL VALUE: We know that fruits, particularly berries and thosewith exotic colors are rich in antioxidants, which means that they are hugeboosters to your health. Strawberries are no exception to this rule; inaddition to antioxidants and polyphenols, they have many other nutrients, vitamins, and minerals that contribute to the overall health benefits of theseberries. These nutrients include vitamin C, folate, potassium, manganese, dietary fibre, and magnesium.

Energy 136 kJ Water 91 % Protein 0. 7 g Sugar 4. 9 g Fiber 2 g Fat 0. 3 g Saturated 0. 02 g Monounsaturated 0. 04 g Polyunsaturated 0. 16 g NUTRITIONALVALUE: STRAWBERRIES, RAW – 100 GRAMSBENEFITS: 1. Strawberries are helpful because they containpotassium, which helps in maintaining the correct ocular pressure.

Ocularpressure means the pressure within the eyes. Any disturbance in this pressurecan be harmful to the eyes. 2. Vitamin C present in strawberry boosts the immunesystem and helping in curing common cough and cold. 3. A single serving of strawberries has approximately 150%of your daily requirement of vitamin C. 4. It is said that a serving of fruits every day willremove the “ rust” from joints.

Strawberries are abundant in antioxidants anddetoxifiers, which help in treating primary causes of arthritis and gout. 5. Vitamin-C, folate, anthocyanins, quercetin, andkaempferol are just a few of the many flavonoids in strawberries which possessexcellent antioxidant and anticarcinogenic properties. Together, they form anexcellent line of defense to fight cancer and tumor growth. Daily intake ofstrawberries is connected to a drastic reduction in the presence and metastasisof cancer cells. 6. Strawberries are rich in iodine as well, which is veryhelpful for regulating the proper functioning of the brain and nervous system. 7.

Potassium, is a vasodilator, meaning that it reduceshypertension and the rigidity of arteries and blood vessels which is found insignificant quantities in strawberries, also has been linked to improvedcognitive function by increasing the blood flow to the brain. 8. Strawberry promotes weight loss due to the presence ofvarious nutrients that help to stimulate metabolism and reduce appetite. 9.

High fiber content, folate, no fats, and high levels ofantioxidants such as vitamin-C and phytochemicals form an ideal cardiac healthpack, as they effectively reduce cholesterol in the arteries and vessels. Somemembers of

the vitamin-B family present in strawberries also strengthen thecardiac muscles and lead to better functioning of the heart. 10. Strawberriesare rich in potassium and magnesium content, both of which are effective inlowering high blood pressure caused by sodium and various other risk factors. ALLERGY: Some people experience an anaphylactoid reaction toeating strawberries.

The most common form of this reaction is oral allergysyndrome, but symptoms may also mimic hay fever or include dermatitis or hives, and, in severe cases, may cause breathing problems. Proteomic studies indicatethat the allergen may be tied to a protein for the red anthocyanin biosynthesisexpressed in strawberry ripening, named Fraa1 (Fragaria allergen1). Homologous proteins are found in birch pollen andapple, suggesting that people may develop cross-reactivity to all threespecies. White-fruited strawberry cultivars, lacking Fra a1, may be an option for strawberry allergy sufferers. Since they lack a proteinnecessary for normal ripening by anthocyanin synthesis of red pigments, they donot turn the mature berries of another cultivars red. They ripen but remainwhite, pale yellow or “ golden”, appearing like immature berries; this also hasthe advantage of making them less attractive to birds. A virtuallyallergen-free cultivar named ‘ Sofar’ is available. GENETICS: Strawberry plants have unique diversity when it comesto their genetic makeup.

Strawberry plant species have varying numbers ofchromosomes. Official number of chromosomes is 7. Normally strawberries would have 14 chromosomes (2n), tomake larger berries, 8 duplicate copies of the

genome (8n known as octaploids). It sequencedto display 7, 096 genes. Strawberriessuffer from severe inbreeding depression, and most cultivars are highlyheterozygous. Most species are diploid, meaning they have two sets ofchromosomes, one set of chromosomes is normally inherited from eachparent.

Polyploidy, a condition more common in plants, occurs whenmultiple pairs of chromosomes are present in the genetic component of anorganism. Strawberry species andhybrids can be diploid, tetraploid, pentaploid, hexaploid, heptaploid, octoploid, or decaploid (having 2, 4, 5, 6, 7, 8, or 10 sets of the sevenstrawberry chromosomes, respectively). Strawberries have many different chromosomenumbers.

While these are four of the most common numbers of chromosome pairssome strawberries can have as many as 16. Followingare some species along with their natives: Diploid: Fragaria daltoniana — native to AsiaFragaria nilgerrensis — native to South AsiaFragaria nubicola — native to South AsiaFragaria vesca — found throughout Europe, North America, and Northern Asia as well as North Africa, the mountains of South America, andthe northern polar region. Fragaria viridis— native to Central EuropeTetraploid: Fragaria moupinensis— native to East Central AsiaFragaria orientalis— native to Northeast AsiaHexaploid: Fragaria moschata— native to Central EuropeOctaploid: Fragaria chiloensis— native to South Chile, mountains of HawaiiFragaria ovalis— native to Western North AmericaFragaria virginiana— native to Eastern North AmericaPRODUCTION:

California and Florida are the toptwo strawberry producing states within the U. S.

, with California producing over91 percent of the entire strawberry crop. Florida, however, produces most ofthe domestic winter strawberry crop. Over 4. 3 million tonnes ofstrawberries are produced each year. This has increased from 3.

2 million tonnesover the last decade. Biggest producer is the USA at 1. 3 million tonnes per annum– which represents 30% of the world’s crop. Second one is Turkey with 302, 416tons and Spain in third place with 262, 730 tons. Other top strawberry producingcountries in the world include Egypt, Mexico, Russia, Japan, South Korea, Poland, and Germany. The areas grown and their respective yields varyconsiderably, largely due to production methods.

In Pakistan, it is grown in northern areas like Swat, Charsadda, Mansehra, Haripur, Abbottabad, Mardan, Peshawar and some parts ofcentral Pakistan. In Pakistan, it is grown on area of 78 hectares with annualproduction of about 274 tonnes. The average per acre yield is very low as compared toother strawberry growing countries.

Qualityimprovement: As strawberryflavor and fragrance are popular characteristics for consumers, they are usedwidely in a variety of manufacturing, including foods, beverages, confections, perfumes and cosmetics. Sweetness, fragrance and complex flavor are favorableattributes. In plant breeding and farming, emphasis is placed on sugars, acids, and volatile compounds, which improve the taste and fragrance of a

ripestrawberry. Esters, terpenes, and furans are chemical compounds having thestrongest relationships to strawberry flavor and fragrance, with a total of 31volatile compounds significantly correlated to favorable flavor and fragrance. Color: Pelargonidin-3-glucoside is the major anthocyanin instrawberries and cyanidin-3-glucoside is found in smaller proportions. Althoughglucose seems to be the most common substituting sugar in strawberryanthocyanins, rutinose, arabinose, and rhamnose conjugates have been found insome strawberry cultivars. One of the pigments, cyanidin, that makes up the redcolor in strawberries has a much higher antioxidant potential than others. Fragrance: Chemicals present in the fragrance of strawberriesinclude: ethyl acetate, ethyl benzoate, ethyl butyrate, amyl acetate, amylbutyrate, benzaldehyde, benzyl acetate etc.

Perishability: The fruit is highly perishable with a shelf life of2–3 days at room temperature and is vulnerable to postharvest decay due to itshigh respiration rate, environmental stresses and pathogenic attacks. Freshstrawberries are highly perishable and cannot be stored except briefly. Formaximum life, perhaps of 5-7 days, fruit should be precooled immediately afterharvest and placed at 0°C. The temperature of harvested strawberries in thefield can get up to 30°, and higher when exposed to sun. Precooling of wholepallets by forced air is recommended because the desired temperature (1°) canbe obtained with in 1 hour, whereas air cooling takes 9 hours. After a few days in storage, the fruit loses some ofits fresh bright color, tends to shrivel, and deteriorates in flavor. Deterioration is arrested by low temperature; but after removal from storage, it proceeds more rapidly than

in freshly picked strawberries. The majordiseases causing storage losses in strawberries are gray mold rot, Rhizopusrot, and leather rot.

Prompt precooling to temperatures of 5° or below andholding at such temperatures in transit, storage, and during marketing will minimizesuch losses. Refrigeration is sometimes supplemented with carbondioxide gas from dry ice to modify the atmosphere during transit or storage. Inair transport, pallets are covered with curtain coated fiberboard orheat-shrink polyethylene to retain the high level of carbon dioxide. Highlevels of carbon dioxide (10 to 30 percent) slow the respiration rate of thefruit and reduce the activity of decay-causing organisms, thus extendingstorage and market life. Carbon dioxide atmospheres of 30 percent or greatercan cause off-flavor.

Low-oxygen atmospheres of 0. 5 to 2 percent will alsoreduce respiration rate and decay, but the fruit develops off-flavor. Postharvest chemical and heat treatments can be useful in reducing decay duringstorage and handling. However, surface sheen can be lost when fruit are dippedin water or solutions. Breedingtechniques: Traditional breeding: Traditional breeding refers to the processof allowing certain chosen plants to sexually reproduce with other plants. Plants are chosen based on favorable characteristics.

Simply put, traditionalbreeding takes plants with favourable characteristics and breeds them. Then theoffspring are raised and then judgment is made about which ones have the besttraits and the process proceeds to the next generation. This method has beenthe way that humans have traditionally modified organisms. Not until the 20thcentury were humans able to

influence the genotypes of organisms in any otherway e. g. the “ Downton” was a successful variety developed byAndrew Knight because of his 1817 breeding experiment. The mother of thisvariety was a plant grown from seeds direct from America (probably F. Virginiana) and its father was the variety “ Old Black”, which is ofuncertain origin.

This variety was created by pollination, not directmanipulation of the plant’s genes. Genetic engineering: Geneticengineering is typically defined as the introduction of non-native genes intoan organism. An example of cold resistance: An excellent example oftransgenic modification is in the case of ‘ cold resistant strawberries’. In onevariety genes from the arctic flounder, a fish that lives in very cold water, were used to give plants resistance to cold. This modification works because ofthe genetics of the arctic flounder. It lives in water where other fish wouldfreeze to death but, with a special gene that allows it to produce a sort ofanti-freeze, it can survive.

This gene is put into a bacterium that is sprayedon the strawberry during the freezing temperatures, allowing it to also beresistant to cold. The strawberry is then cleaned, removing the bacteria. Factorseffecting quality of strawberry: Effect of ozone treatment: Strawberry fruits (Fragaria × ananassa) were stored at 2 °C in anatmosphere containing ozone (0. 35 ppm).

After 3 days at 2 °C, fruits were movedto 20 °C to mimic retail conditions (shelf life). The changes in severalquality parameters such as fungal decay, colour, sugar and acids distribution, andaroma were evaluated during the

strawberries’ shelf life. Ozone treatment wasineffective in preventing fungal decay in strawberries after 4 days at 20 °C.

Significant differences in sugars and ascorbic acid content were found inozone-treated strawberries. At the end of cold storage, the vitamin C contentof ozonated strawberries was 3 times that of control fruits. A detrimentaleffect of ozone treatment on strawberry aroma was observed, with a 40% reducedemission of volatile esters in ozonated fruits.

Thawing: Vacuuminfusion (VI), freezing, frozen storage and thawing conditions were optimizedto minimize the texture loss of frozen strawberries. Slow freezing causedsevere loss in textural quality of the strawberries. This quality loss couldnot be prevented by the application of VI prior to slow freezing, or by theapplication of rapid, cryogenic or high-pressure shift freezing conditions onnon-infused fruits. A remarkable texture improvement was noticed when infusionof pectin methyl esterase (PME) and calcium was combined with rapid orcryogenic freezing.

The highly beneficial effect of PME/Ca-infusion followed byHPSF on the hardness retention of frozen strawberries was ascribed to thecombined effect of the infused PME (53% reduction in degree of esterification(DE) of the strawberry pectin) and the high degree of supercooling during HPSF. During frozen storage, textural quality of PME/Ca-infused high-pressure frozenstrawberries was maintained at temperatures below ? 8 °C, whereas the texture ofPME/Ca-infused strawberries frozen under cryogenic freezing conditions was onlypreserved at temperatures below ? 18 °C. Thawing at room temperature seemed tobe an appropriate method to thaw

strawberries. Fast thawing by high-pressureinduced thawing (HPIT) did not prevent textural quality loss of frozenstrawberries.

Frozen strawberries were thawed under different controlledconditions (natural thawing at room temperature, thawing in circulating air, thawing in a refrigerator, thawing in water and thawing in a convection oven). The effects of thawing method on the weight loss in strawberries weredetermined. Strawberries thawed at higher temperatures showed greater weightloss. During thawing in circulating air, thawing time decreased with increasingair velocity. Conclusion: Postharvest decay of fruits andvegetables triggered by inappropriate storage conditions, pathogenic attacks, mechanical injuries and environmental stresses.

To reduce postharvest lossesand extend shelf life of fresh produce, different techniques such as lowtemperature storage, control atmosphere packaging and surface treatment withsynthetic chemicals have been widely practiced. Gamma irradiation has beensuccessfully used as an alternative treatment for microbial disinfection andlongevity of shelf life of fresh produce.