



PRELIMINARY
FEASIBILITY PLANT DESIGN
REPORT
OF
THE ORANGE JUICE PRODUCTION

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SUMMARY

In the recent years the consumption of fruit juice has been increasing. According to market researches, the average amount of orange used for processing fruit juice is 40.000 t in the last 10 years and a market share of 5% is targeted. During the next 5-6 months, orange juice will be processed in the factory which has 2000 t of annual production. Lemon juice and other kind of citrus juice will also be produced.

Raw materials for the process will be brought from Antalya. Homebred type of oranges as well as some foreign type of oranges are growing in Antalya.

Mass balance has been calculated after preparing the flow sheet diagram of 100 % orange juice. Capacity of equipments which are sufficient to process required raw material has been determined. Their energy consumptions are found and selected. According to this information, energy balances have been calculated. Capacity of processing of fruit juice is determined as 1.5 t/h.

In orange juice industry, there are waste parts and by-products like essential oil and diet fiber.

The plant will be built in Antalya in order to have close access to raw material and water. The drinking water has the best quality in this region. Total area of plant is planned to be 7000m². A total of area is 10000m².

Total personnel number is 43. There are **20** workers, **1** manager, 1 Quality Manager, 2 Accountants, 4 technician of process, 2 technician of maintenance and 2 technician of analysis, 1 Personnel Manager, 1 Production Manager, 1 Secretary , 2 Food Engineer, 2 Security, 4 cleaning personnel.

INTRODUCTION

Production and consumption of fruit juice is increasing year by year in Turkey. According to that exportation and importation ratio in Turkey are changing every year.

100 % fruit juice consumption increase by increasing the conscious food consumption. Orange juice which will be produced according to food quality standards in our plant, will be contributed for conscious food consumption by correct marketing techniques.

Fruit juice, fruit nectar, fruit drinks, concentrated fruit juice and aromatic drinks with fruit are most preferred products which are producing in fruit process plants.

Orange is very rich in minerals and vitamins. It is also healthy when it is consumed as orange juice. Orange juice can be consumed in all meals. Especially consuming the orange juice in the mornings is helpful to diet as an anti-oxidant.

Orange juice industry has continued to develop. But insufficient marketing techniques and unconscious food consumption are preventing the development to speed up in Turkey. So orange juice has not yet developed to reach amount of consuming in EU. One of the main purpose of our business of the people living in Turkey is to increase the level of orange juice consumption.

The reasons mentioned above for the establishment of this plant decisions are the main factors. Keep in mind is to be close to raw material, plant has 7 t / day processing orange as fruit juice, 12 t / day total orange capacity, will be installed in Antalya. Determining the construction of factories in this report, to be used in processing techniques, raw material properties to be used in business, energy and mass balances, market research, the factory's social, economic, industrial, legal status will be presented.

1. SUMMARY of PROJECT

1.1. Name Of Project: Processed orange juice plant

1.2. Plant Location: Antalya

1.3. Capacity: 7 ton/day

1.4. Raw Material: Orange

1.5. Production Technology: Extraction and centrifuges

2. DEFINITION OF PROJECT

2.1 Aim of The Project

Consumption the orange juice is increasing in Turkey year by year. Orange juice indicates high amount Vitamin C. Vitamin C is unstable. The aim of the project is while protecting the Vitamin C by optimum conditions and providing 100% orange juice with high quality.

2.2 Marketing Research of Orange Juice

The number of firms is 34 in fruit juice industry in Turkey in 2007. 10 of them produce only fruit juice, 12 of them produce only fruit concentrate, 12 of them produce fruit juice and fruit concentrate. **Table 2.2.1** shows the companies have production in Turkey.

Table 2.2.1 Main companies in sector of fruit juice and their products

Firm	Product	Firm	Product
AK (ÜLKER,İÇİM)	FJ	GÖKNUR (DROPS)	C+FJ
ANADOLU	C	GÜLSAN (MEYSU)	C+FJ
AOC	FJ	KIZIKLI (NETTO)	C+FJ
ARISU	C	KONFRUT	C
AROMA	C+FJ	LİMKON	C
ASLANOBA	FJ	MAVİDENİZ	C
ASYA	C	MEYKON	C
AYTAÇ	FJ	OĞUZ (BANİ, DAREN)	C+FJ
COCA COLA (CAPPY)	FJ	PENKON	C
DİMES	C+FJ	PINAR	FJ
ELİTE NATYREL	FJ	TAMEK	C+FJ
ELMASU	C	TARGID	C
ERSU	C+FJ	TASKOBİRLİK	FJ
ETAP	C	TAT	C+FJ
FRİGOPAK (SUN PRIDE)	C+FJ	TUNAY	C
GETA (EXOTIC)	FJ	YÖRSAN	FJ
GOLDEN	C+FJ	YUMMY	C+FJ

FJ: Fruit juice **C:** Concentrated or pure

As shown in **Table 2.2.2**, the orange harvest in Turkey has increased with wavy course since 2000.

Table 2.2.2 Amount of harvested orange 2000-2007 (*1000 t)

YEAR	2000	2001	2002	2003	2004	2005	2006	2007
Orange	1070	1250	1250	1250	1300	1445	1536	1441

In Turkey, in the amount of orange juice is processed to, significant growth is observed since 2000 (**Table 2.2.3**). Compared to the change between in the amount of the oranges are used as Fruit juice and oranges are used for table consumption, increasing at the orange juice consumption are observed.

Table 2.2.3 Processed orange as fruit juice 2000-2007 (*1000 t)

YEAR	2000	2001	2002	2003	2004	2005	2006	2007
Orange	22.9	12.6	31.7	28.3	46.2	33.1	37.8	53.3

Concentrated orange juice production in the years to follow an irregular course as shown in **Table 2.2.4**. Concentrated orange juice production is not related with the amount of harvest. For example, according to the previous year, while the orange harvest reduces the amount of orange juice concentrate production increased, in 2007.

Table 2.2.4 Concentrated orange juice 2000-2007 (*1000 t)

YEAR	2000	2001	2002	2003	2004	2005	2006	2007
Orange	1.2	0.8	1.6	1.4	2.3	1.5	1.5	1.6

Processed fruit is released largely in the form of fruit nectar . The amount of fruit is processed to fruit beverages decreased, aromatic beverages increased as the amount of fruit is processed. Significant increases in the production of aromatic drink is detected in some years (**Table 2.2.5 and Table 2.2.6**).

Processed fruit largely in the form of fruit nectar is released. Over the years the amount of fruit beverages decreased as the fruit is processed as aromatic beverages increased the amount of fruit. Some of the significant increase in the production of aromatic beverages has shown.

Table 2.2.5 Consumption of fruit juice and another products 2000-2007 (*10⁶ L)

YEAR	2000	2001	2002	2003	2004	2005	2006	2007
FJ	1.9	3.9	5.6	9.3	12.2	30.6	74.7	73.4
FN	202.8	212.1	208.5	233.6	300.3	368.9	509.2	252.9
FD	56.7	51.5	27.2	16.0	17.4	29.6	41.0	25.7
AD	33.5	34.6	52.6	98.4	129.4	83.3	121.9	123.1
Total	294.9	302.1	293.9	357.3	459.3	512.4	746.8	748.1

FJ: Fruit Juice **FN:** Fruit Nectar **FD:** Fruit Drinks **AD:** Aromatic Drinks

Table 2.2.6 Consumption of fruit juice and another products 2000-2007 (%)

YEAR	2000	2001	2002	2003	2004	2005	2006	2007
FJ	0.6	1.3	1.9	2.6	2.7	5.9	10.0	9.8
FN	68.8	70.2	70.9	65.4	65.4	71.9	68.2	70.3
FD	19.3	17.	9.3	4.5	3.8	5.8	5.5	3.4
AD	11.,3	11.5	17.9	27.5	28.1	16.4	16.3	16.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

FJ: Fruit Juice **FN:** Fruit Nectar **FD:** Fruit Drinks **AD:** Aromatic Drinks

The per capita consumption of fruit nectar, according to other types of consumption is greater. The products obtained from fruit per capita consumption increased to 4.4 liters from 10.06 liters since 2000. (**Table 2.2.7** and **Table 2.2.8**)

Table 2.2.7 Consumption of fruit juice and another products in Turkey,2007 (%)

TYPE OF DRINK	Consumption in Turkey				
	2006 (*10 ⁶ L)	% (2006)	2007 (*10 ⁶ L)	% (2007)	Change by year (2006-2007)
FJ	46.6	7.8	62.6	8.8	+34.3
FN	399.5	67.0	502.3	70.8	+25.7
FD	30.4	5.1	24.1	3.4	-20.7

AD	119.8	20.1	120.6	17.0	+0.7
Total	596.3	100.0	709.6	100.0	+19.0

FJ: Fruit Juice **FN:** Fruit Nectar **FD:** Fruit Drinks **AD:** Aromatic Drinks

Table 2.2.8 Consumption of fruit juice and another products 2000-2007 (L/person*year)

TYPE OF DRINK	2000	2001	2002	2003	2004	2005	2006	2007
FJ	0.03	0.06	0.08	0.13	0.17	0.43	0.63	0.89
FN	3.00	3.09	2.99	3.30	4.18	5.12	5.41	7.12
FD	0.84	0.75	0.39	0.23	0.24	0.41	0.41	0.34
AD	0.49	0.50	0.76	1.39	1.80	1.16	1.62	1.71
FJ+FN+FD (1)	3.9	3.9	3.5	3.7	4.6	5.96	6.45	8.35
FJ+FN+FD+AD	4.4	4.4	4.3	5.1	6.4	7.1	8.07	10.06
Index (1)	100.0	100.0	89.7	94.9	117.9	152.8	165.4	214.1
Index (2)	100.0	100.0	97.7	115.9	145.5	161.4	183.4	228.6
							100	124.7

FJ: Fruit Juice **FN:** Fruit Nectar **FD:** Fruit Drinks **AD:** Aromatic Drinks

Fruit juice and fruit nectar is much better presented in 1 liter cardboard packaging, fruit drinks 200 g cardboard packaging and the aromatic beverages in plastic bottles is offered to the consumer. Percentage of packaging variations of fruit juice products has shown in **Table 2.9**.

Table 2.2.9 Preferred package for fruit juice and etc. (%)

TYPE OF PACKAGE	FJ	FN	FD	AD
Carton (1/1)	72.1	51.6	22.4	7.6
Carton (1/5)	5.9	33.6	55.5	34.2
Carton (3/4,1/4)	-	0.1	3.7	-
Metal	1.0	8.3	-	-
Glass	16.3	6.4	18.4	-
Pet bottle	4.7	-	-	58.2
TOTAL	100.0	100.0	100.0	100.0

FJ: Fruit Juice **FN:** Fruit Nectar **FD:** Fruit Drinks **AD:** Aromatic Drinks

Exports of fruit juice increased 1,5 times, fruit juice imports increased approximately 5,5 times since 2000.

Table 2.2.10 Importation and exportation of fruit juice in Turkey 2000-2007 (1000 t)

YEAR	IMPORT	EXPORT
2000	3.316	52.288
2001	3.433	71.343
2002	3.986	55.278
2003	4.095	84.808
2004	6.592	79.859
2005	9.616	97.304
2006	16.656	77.452
2007	18.621	81.029

2.3 Raw Material

Orange is the commonly known member of the citrus fruits. The other citrus are lemon, tangerine and grapefruit. Citrus are grown between 36 degrees north and south parallel.

Middle and North America and Mediterranean countries in northern hemisphere, South Africa in southern hemisphere has suitable climate to grown citrus.

Ecological conditions of some regions in turkey production is suitable for citrus. In particular, Antalya and Çukurova, all varieties of orange can be grown. Orange tree as known “citrus sinensis” Latin name. Another citrus names as Latin name are shown in **Table 2.3.1**.

Table 2.3.1 Classification according to the shell color of citrus fruit

Yellow-colored Species	
Citrus medica L.	Zetrat – Lemon
Citrus lemon (L) Burmf.	Lemon
Citrus aurantifolia Swing	Lumie, Limette
Citrus Grandis (L) Osbeck	Pampelmuse
Citrus Paradisi Macfadyen	Grapefruit
Orange-colored Species	
Citrus aurantium L.	Bitter orange
Citrus sinensis (L) Osbeck	Sweet orange

Citrus reticula Blanco	Tangerine
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2.3.1 Physical Properties of Orange and Orange Tree

Orange tree has a smooth appearance with log and arms. Leafs have oval shape, dark green, shiny appearance. Flowers is white-colored with nice odor(**Figure 2.1**). Oranges are usually round shaped. As some kind of difference can be shown. In general, the round-shaped fruits have an orange-colored and soft shell. Orange has the shell and pulp.



Figure 2.1

2.3.2. Chemical Properties of Orange

Bricks degree in orange at least, most and average are 11,18; 13,54; 11,41 respectively. **Table 2.3.2.1** also shows a combination of orange in the edible portion. 100 grams of orange fruit in nutritional value is determined by the TSE has been displayed in **Table 2.3.2.2**.

Table 2.3.2.1 The composition edible part of an orange

Component	Amount (g)
Carbohydrates (g/l)	67 – 122
Niacin ($\mu\text{g}/\text{kg}$)	7000 – 3000
Thiamine ($\mu\text{g}/\text{kg}$)	300 – 600
Water (%)	82,7 – 89,3
Protein (g/l)	8 – 11
Acidity of titration (g/l)	12,1 – 15,9
Ascorbic acid (mg/kg)	50 – 152
Potassium (mg/kg)	1900 – 3700
Calcium (mg/kg)	120 – 200
Phosphorus (mg/kg)	180 – 230
Magnesium (mg/kg)	70 – 140
Beta Carotene ($\mu\text{g}/\text{kg}$)	4500 – 35000

Table 2.3.2.2 The composition of orange (~100 g)

Component	Amount (g)
Water	86,6
Protein	0,7 - 1,3
Oil	0,1 - 0,3
Fiber	0,5
Ash	0,5 - 0,7
Calcium	0,04 - 0,043
Phosphorus	0,017 - 0,022
Iron	0,0002 – 0,0008
Carotene	200 IU. (Vitamin A)
Thiamine	0,00010
Riboflavin	0,00004

Orange's carbohydrate content varies are between 15% to 10%. Carbohydrates in orange; as sugars and polysaccharides can be analyzed in two main sections. Sugars in orange, respectively sucrose (3.46%), fructose (2.45%), glucose (2.27%). Orange's glisemic index is 62 ± 6 . Moreover, sorbitol as a derivative of sugar in some fruits are definitely not available in orange.

The main polysaccharides found in fruits are cellulose and hemicelluloses which the basis of cell wall substances. Also they are found in large amounts in orange shell, core zone membrane. Cellulose and hemicelluloses are separated and discarded in waste at process of orange juice. However, a portion goes to pulp. The dominant fiber is pectin in orange. Orange includes pectin which has 70% with 65% of the total fiber.

Free amino acids in Orange change between 700-1300 mg/100 g according to the TSE 34 (2007). As other plant and animal tissues, many different enzymes are available in orange fruit. Fruits provide respiratory energy from sugar and acid. This is why fruit is stored for a long time, is seen to decrease acidity. Most important organic acids in orange are ascorbic acid, citric acid, tartaric, malic, benzoic acid and succinic acid. Citric acid and malic acid

creates the acidity of orange. especially citric acid is found in large amounts in citrus. Ascorbic acid is an organic acid with antioxidant properties. In generally, ascorbic acid is known as vitamin C. Potassium has the most amount mineral in orange. After potassium, most of the minerals are phosphorus, calcium and magnesium. Sulfur and chlorine -as non-metallic minerals- follows them. Sodium and iron are found in very low concentrations. **Table 2.3.2.3** shows that on mineral substances in citrus. The most important ones to generate aroma compounds are citral, terpenoid and lemonoid. The color of the orange pigment is carotenoid and antocianin group.

Table 2.3.2.3 The composition of minerals in citrus (mg/100g) (FAO report,2000)

Citrus	Na	K	C	Mg	Fe	P	S	Cl
Orange (juice)	1,7	179	11,5	11,5	0,3	21,7	4,6	1,2
Lemon (juice)	1,5	142	8,4	6,6	0,14	10,3	2,0	2,6
Grapefruit (pulp)	1,4	234	17,1	10,4	0,26	15,6	5,1	0,6

Comparing the nutrient compounds of an orange and 200 ml glass of orange juice is shown in **Table 2.3.2.4**

Table 2.3.2.4 Nutrient content orange vs. orange juice (Guthrie and Picciano, 1995)

Content	An orange at middle size	A glass of orange juice (250 ml)
Calorie:	64	110
Oil (g)	0,1	0,7
Fiber (g)	3,4	0,5
Protein (g)	1	2
Carbohydrates (g)	16	25
Cholesterol (mg)	0	0
Sodium (mg)	1	3
Vitamin C (mg)	80	82
Folate (mcg)	47	45
Potassium (mg)	15	473

2.3.3. Varieties of Orange

2.3.3.1. Persian orange

The Persian orange, grown widely in southern Europe after its introduction to Italy in the 11th century, was bitter. Sweet oranges brought to Europe in the 15th century from India by Portuguese traders, quickly displaced the bitter, and are now the most common variety of orange cultivated. The sweet orange will grow to different sizes and colors according to local conditions, most commonly with ten carpels, or segments, inside.

2.3.3.2. Navel orange

A single mutation in 1820 in an orchard of sweet oranges planted at a monastery in Brazil yielded the **navel orange**, also known as the Washington, Riverside, or Bahia navel (**Figure 2.2**). The mutation causes navel oranges to develop a second orange at the base of the original fruit, opposite the stem. The second orange develops as a conjoined twin in a set of smaller segments embedded within the peel of the larger orange. From the outside, it looks similar to the human navel.



Figure 2.2 (a)



Figure 2.2 (b)

Because the mutation left the fruit seedless and, therefore, sterile, the only means available to cultivate more of this new variety is to graft cuttings onto other varieties of citrus tree. Two such cuttings of the original tree were transplanted to Riverside, California in 1870, which eventually led to worldwide popularity.

Today, navel oranges continue to be produced cutting and grafting. This does not allow for the usual selective breeding methodologies, and so not only do the navel oranges of today have exactly the same genetic makeup as the original tree, and are therefore clones; in a sense, all navel oranges can be considered to be the fruit of that single over-a-century-old tree.

2.3.3.3. Dream Navel

Dream Navel is known for its easy peeling and separation; but it is also a sweet, juicy, less acidic orange than most other navels(**Figure 2.3**). It is a round shape, with nine to twelve segments, and is often seedless. The Dream is small to medium-sized with a pale orange rind, light orange pulp, and a pleasant ripe-mango aroma. The Dream Navel, a name patented in 1944, was discovered in Orlando, Florida, which gave rise to such other dream makers as Walt Disney.



Figure 2.3

2.3.3.4. Valencia orange

The Valencia or Murcia orange is one of the sweet oranges used for juice extraction(**Figure 2.4**). It is a late-season fruit, and therefore a popular variety when the navel oranges are out of season. Primarily grown for processing and juice production, Valencia oranges have seeds, varying in number from zero to six per fruit. However, its excellent taste and internal color make it desirable for the fresh markets, too. The fruit has an average diameter of 2.7 to 3 inches (70 - 76 mm). After bloom, it usually carries two crops on the tree, the old and the new. The commercial harvest season in Florida runs from March to June. Worldwide Valencia oranges are prized as the only variety of orange in season during



Figure 2.4

2.3.3.5. Blood orange

The blood orange has streaks of red in the fruit, and the juice is often a dark burgundy color(**Figure 2.5**). The fruit has found a niche as an interesting ingredient variation on

traditional Seville marmalade, with its striking red streaks and distinct flavour. The **scarlet navel** is a variety with the same dual-fruit mutation as the navel orange.



Figure 2.5

2.3.3.6. Cara Cara

Cara Cara is also known as the Red Navel and is likely the product of a Washington and the Brazilian Baha'i navel union. The fruit and juice are a dark red color and extremely sweet with a low acid content. It originated at the Hacienda de Cara Cara in Valencia, Venezuela. It is a medium-sized round fruit with ten to twelve segments and few, if any, seeds. The yellowish orange rind and rich red pulp make it quite distinguishable and its appeal increases because of its cherry-flavoured overtones.

2.3.3.7. Hamlin

Hamlin originated as a chance seedling in a grove near Glenwood, Florida, owned by A. G. Hamlin, and has become the most widely grown orange variety in Florida. It survived the great freeze of 1894-1895, which made it a greater rival of the Parson Brown. This medium to small globular fruit is bright orange when mature at harvest between October and January. Its thin rind has a very fleshy pulp, making it one of the most productive oranges for processing. It has a sweet flavour lacking in acid and usually with few seeds.

2.3.3.8. Jaffa

Jaffa and another fruit of the genus Joppa are seedlings from the Israel Beledi tree, which also produced the Shamouti. The Jaffa was first introduced to Florida in the 1880s as a potentially cold-tolerant, high quality, midseason species, and soon became popular for its flavour enjoyed as juice or in cooking. The Jaffa orange is also very popular in Great Britain, where Richard the Lion-Hearted spent the winter of 1191 in the citrus groves of Jaffa during his

crusades. The fruit is oblique-shaped, with a slightly rough, light orange rind. The flesh is a pale orange, with only ten segments and a few seeds.

2.3.3.9. Moro

Moro is a "blood" orange, so named for its dark burgundy color of its rind. Originally from Sicily, it is common throughout Italy, and quite versatile fresh or cooked. This medium-sized fruit has a relatively long harvest, lasting from December through to April. The orange has ten to twelve segments and is almost seedless. The flavour is unequalled, ranging from sweet to tart with berrylike overtones. The Moro is now known as the "connoisseur's citrus".

2.3.3.10. Moro Tarocco

Moro Tarocco is Italy's finest orange variety and among the best of the Mediterranean fruit, having the perfect balance between sweetness and acidity. The ovoid shape resembles that of the tangelo or Minneola. It is a medium-sized seedless fruit with a rich, juicy, raspberry flavour, which is excellent for juicing or cooking. The original mutation occurred in the 17th century in Sicily, creating the striking caramel-toned endocarp. This color is the result of the pigment called anthocarpium, not usually found in citrus, but is common in other red fruits and flowers.

2.3.3.11. Domestic Oranges

In generally domestic oranges are called as where they grown according to their ecological conditions. Our major domestic orange varieties; Alanya dilimli, Finike yerli, Dörtyol yerli, Kozan yerli, Sultanhisar.

Usually round-shaped, with kernel and high water content varieties. Trees are appropriate for ecology, and are very efficient. However, in almost all the local orange varieties preciosity trend is seen more. Apart from its own ecology in the big drop in quality is usually. This is why this cultivated of oranges as the region remained very limited. It is usually used in the fruit juice industry because of with multi-core.

2.4 Techniques of Process

2.4.1 Flow Sheet Diagram

2.4.1.1. Orange Unloading

Orange may be unloaded either via dry or with water-flume systems. The dry system includes aerated silos with sloping planes. On which the product is placed in layers to protect integrity of orange. The water system involves large concrete tanks at ground level, the product is discharged directly into these tanks of the truck and move by means of water circulation which conveys the product to a special elevator.

The transfer system consist of a set of conveyor belts that transfer the orange from the storage bins to a bucket elevator prior to entering the juice extraction area.

2.4.1.2. Storage

Unwholesome fruit is removed during unloading before the oranges are conveyed to storage bins. Wood and metal bins are commonly used, and are designed with baffles to minimize impact as fruit descends through to the base of the bin. As the plant begins the day's operation the oranges roll out of the bins into conveyor belts, and are transported to the main extraction line via a bucket elevator and on to a surge bin. The surge bin serves as a buffer to control and maintain an adequate fruit flow for the extraction line. The oranges are pulled from the surge bin into a brush washer, washed, sanitized and graded again before juice extraction. Detergents and a chlorinated water rinse can be used. Cooled condensate water from juice evaporation may also be used in the washing step.

2.4.1.3. Washing

The first process applied to the washing plant is a fruit. The purpose of the washing process, to prevent residues of agricultural medicines and remove dust, mud which component decrease the quality of orange juice.

2.4.1.4. Brushed Washing

This process, the microorganisms move a significant portion of the fruit away from the fruit reduces the microbial load in orange juice. The water used to wash the fruit weight is 2-3 times. The temperature of wash water, the increase in the washing efficiency. Water temperature must not exceed 35 ° C. Optimum temperature is 15-20 ° C.

2.4.1.5. Sorting

Sorting process, after you wash, before you wash or the wash can be done before and after. Workers remove immaturity oranges, fragmented, the corrupt, rotten fruit, or were softened at a band. They effect of product quality badly. If there is galactronic acid much more 200mg/L, sorting process is not good.

2.4.1.6. Extraction

Extraction of juice from the orange fruit is obtained. Citrus fruits, except fruits, fruit juice is available before making pulp. Or into the pulp is then pressed. Properties of the shell of the citrus and then pressed into because pulp is not possible. Shell oil has been already allocated to it will not allow. Orange juice is taken from orange with extractor. Thus, fruit juice can be obtained.

There are different types of extractor such as Brown, Indelicato, FMC, Bertuzzi. They have different working principles. We use FMC extractor. In this device as fruit and pre-shell without the need for oil extract are separated.

2.4.1.7. Finisher

After extraction, finisher is used for separation of pulp. Finisher, a cylindrical screen with a rotating cylindrical axis or in the pedal or a screw compression is made up of elements. Pulp of at screw finisher, such as compression of the screw presses process is allocated. Pedal through centrifugal force with which the separation occurs pulp. Hole diameter, according to objective and between 0,25-5,0 mm change. The reason for separating the pulp, which affects the quality of orange juice more than the amount of pulp. 3-8% of the desired pulp is.

2.4.1.8. Decanter

Solid particles are removed with orange juice centrifuges. From finisher in the orange juice do not come to the desired level to reduce the amount of pulp is sent to centrifuge process.

2.4.1.9. Deaerotion

We remove air because of quality problems at our product such as color, taste and aroma. Deaerator is a special tank and it has a vacuum pump, a level control equipment and cooling system. It is very important this step at orange juice process because it has vitamin C. Vitamin C has high sensitivity of oxygen.

2.4.1.10. Pasteurization

Pasteurization is developed to inactivate both microorganisms and natural enzymes. Appling heat can damage the delicate flavor components, improvements in orange juice processing . In that case, process is done minimum time and temperature for citrus processing. This process is performed less than 100°C to inactive microorganisms and enzymes which are found in food to be less pH 4,5. PME (pectinmetilesterase) in orange juice is enzyme to be resistance

to heat and to inactive at 90°C. Generally, pasteurization temperature/time is 85-94 °C/30-60s in orange juice(Nelson and Tressler, 1980). If hot filling will be done, temperature and time should be 88-96 °C/about 2 minutes in orange juice pasteurization(Karagozlu, 2003).

2.4.1.11. Cooling

The concentrated juice leaving pasteurization is delivered to a standardizing and refrigerating system prior to filling. This system consist of two stainless steel tanks for bricks standardization and a storage unit from the product is pumped through a plate type heat exchanger. In the heat exchanger the juice is cooled down to a very low temperature .

2.4.1.12. Homogenization

Orange juice is mixed and it has been come homogeneous.

2.4.1.13. Filling

This process includes filling, heating, closing, tagging which is done before storage and distribution for orange juice. Fruit juice which is ready for consumption is filled to bottle, cartoon box or pet material. 0.7, 0.5, 0.33, 0.25 and 0.20 bottles are used in fruit juice production. Washed clear bottles is filled with orange juice. Orange juice is filled hot or cold. In cold filling, temperature between bottle and fruit shouldn't be more than 20-25°C because of broken bottles. If hot filling is done, bottles should leave about 90°C from washing machine. After orange juice is filled bottles are immediately closed. Caps of bottle are sterilized and filling is done with aseptic techniques.



Figure 2.6 Aseptic package

2.4.2 Equipments

These are basic equipments which should be used in the producing of orange juice.

- Stooling Storehouse
- Slope Regulated Elevator
- Washing Unit
- Sorting Unit
- Extractor
- Finisher
- Decanter
- Deaerator
- Pasteurizer
- Cooling Unit
- Mixing Tank
- Packaging Unit

2.4.2.1.Slope Regulated Elevator

This unit is using for transportation of oranges from washing pool to storehouse or sorting unit. Machine is made of stainless steel. With the velocity control unit the rotation of band is adjustable as wish (**Figure 2.6**).

Length	2000 mm
Wideness	400 mm
Power	0,75 kW



Figure 2.6

2.4.2.2.Washing Unit

After the washing pool the oranges is transport to brushed washing unit for last washing process. Machine is made of stainless steel. With the nozzles, water is given to machine and

with the brushes the raw material is cleaning to make it cultivable. The flow is provided with the transporters that lay in drum(**Figure 2.7**).

Capacity	2000 kg/h
Dimensions	2650 mm * 2200 mm
Power	1.5 kW
Drum Diameter	800 mm



Figure 2.7

2.4.2.3. Sorting Unit

Machine is made of stainless steel. There is a illuminating system and also a churn part on the unit to increase the efficiency. With the velocity control unit the rotation of band is adjustable as wish(**Figure 2.8**).

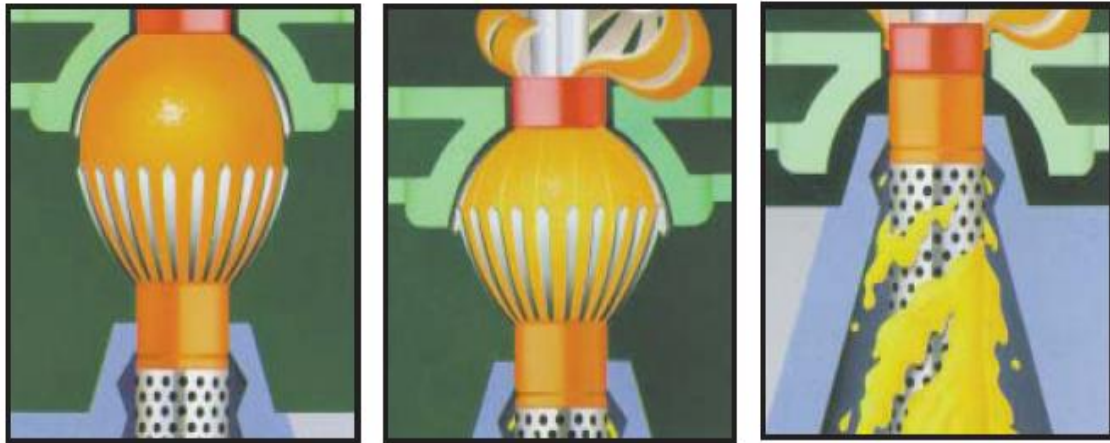
Capacity	2000 kg/h
Dimensions	6000 mm * 800 mm * 850 mm
Power	1.1kW



Figure 2.8

2.4.2.4. FMC Extractor

On this process the volatile oil, juice and the peels are separated. This unit for the production of fresh squeezed orange juice without a need for pre-sizing. It can also process lemons and tangerines. The working principle is shown in the below (**Figure 2.9**).



1. The upper and lower cups begin to come together as the upper and lower cutters cut two holes in the fruit.

2. As the upper and lower cups continue to come together, the peel is separated from the fruit.

3. The peeled fruit moves into the strainer tube where the juice is instantaneously separated from the seeds and the rest of the fruit.

Figure 2.9 (a)

Capacity	1900 kg/h
Dimensions	1800 mm * 900 mm * 750 mm
Power	4 kW



Model
491B

Figure 2.9 (b)

2.4.2.5. Finisher

The juice finisher reduces the pulp contents in fruit juice. It's made of stainless steel. There is an adjustable spring device to generate the counter pressure on the pulp outlet and also an automatic washing system for the internal part of the machine (**Figure 2.10**).

Capacity	4000 kg/h
Power	3 kW
Rotate	300 – 1000 rpm



Figure 2.10

2.4.2.6. Decanter

After finisher the decanter is also reduces the pulp content in juice with a centrifugal force. There is a special device to regulate the liquid ring inside the bowl. It's made of stainless steel. Technical properties of the machine is given below.

Capacity	2500 kg/h
Dimensions	1700 mm * 795 mm * 1090 mm
Power	5.5 kW
Rotation	5200 rpm
Centrifugal Force	3500 xg
Bowl Diameter	232 mm



Figure 2.11

2.4.2.7. Vacuum Deaerator

After the depulping process the air in juice especially oxygen and CO₂ must removed. It's working with a two-stage system of heating and deaerating feed water. This system reduces dissolved oxygen concentration to less than 0.005 cc/liter (7 ppb), and completely eliminates the carbon dioxide concentration.

Capacity	2000 kg/h
Dimensions	2000 mm * 600 mm * 1000 mm
Power	9 kW
Vessel Diameter	1200 mm



Figure 2.11

2.4.2.8. Pasteurizer

With this process the storage time of product is made longer. A process of 90 C/ 15 sec is enough. A tubular pasteurizer is used.

Capacity	3000 kg/h
Dimensions	2000 mm * 1000 mm
Feed Pump Power	1.5 kW
Hot Water Pump Power	0.75 kW



Figure 2.12

2.4.2.9. Cooling Unit

The concentrated juice leaving pasteurization is delivered to a standardizing and refrigerating system prior to filling. This system consist of two stainless steel tanks for bricks standardization and a storage unit from the product is pumped through a plate type heat exchanger. In the heat exchanger the juice is cooled down to a very low temperature.

2.4.2.10. Mixing Tank

The volatile oil is mixing on this process to juice. 2 % of volatile oil that taken from extraction is mixing. Machine is made of stainless steel. The other properties is given below.

Capacity	2000 kg/h
Dimensions	2000 mm * 1000 mm
Power	2 kW



Figure 2.13

2.4.2.11. Packaging Unit

The machine is the two-in-one platform for the 200-1136 ml volume range of packages. The machine has a capacity of 7000 package/h for family packages and 8000 p/h for portion packages.

Capacity	7000 p/h
Dimensions	4000 mm * 6000 mm * 3000
Power	30 kW



Figure 2.14

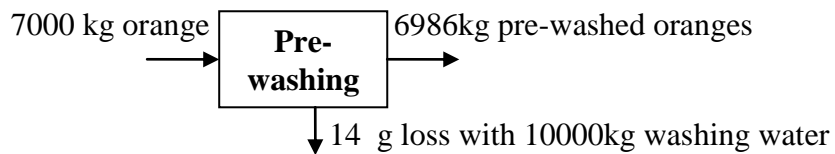
2.5 Energy and Mass Balance

2.5.1. Mass balance

Mass Balances; 7000 kg oranges are processed in a day

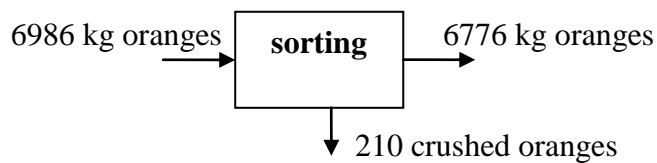
1.For pre-washing;

Assumption; 0,20 % loss for stem, mud, leaf of oranges



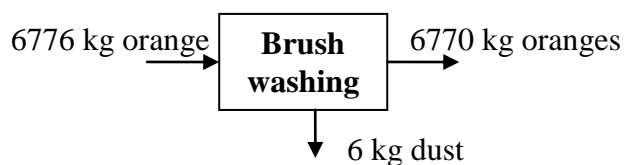
2.Sorting;

Assumption; 3 % loss for rotten and crushed oranges



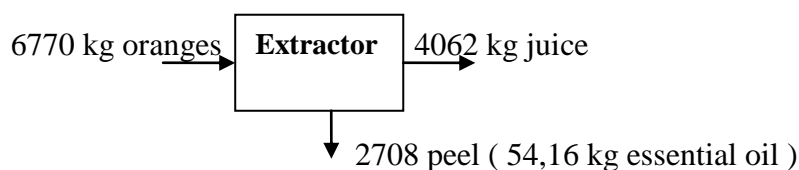
3.Brush Washing;

Assumption; 0,01 % loss dust



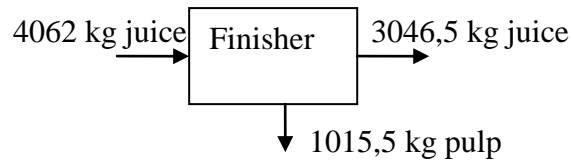
4. In Extractor;

Assumption; 60 % juice, 40 % peel, and in the peel 2 % essential oil



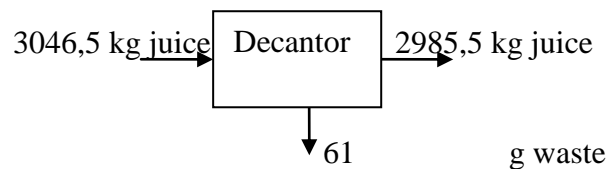
5. Finisher;

Assumption; 25 % pulp, 75 % juice



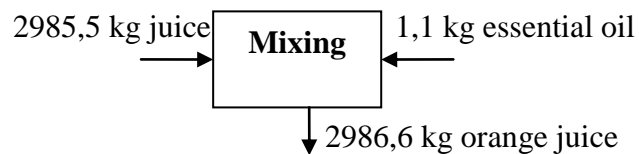
6. In Centrifuge;

Assumption; 2 % waste material after centrifuge



7. Mixing;

Assumption; 2 % essential oil that obtained in extraction is mixing in this process to juice.



Efficiency of process: %42.66

2.5.2. Energy balance

1. Elevator;

Length : 2 m

Width : 0,4 m

Power : 0,75 kW *3600s/h =2700 kJ/h

Capacity : 4tons/h working hour :3 h

Power : $2700 \text{ kJ/h} \times 3 \text{ h} = 8100 \text{ kJ}$

2. Conveyor Belt;

Sorting : labor supply so, working hour is 8 h

Length : 6 m

Width : 0,8 m

Height : 0,85 m

Weight : 175 kg

Power : $1,1 \text{ kW} \times 3600 \text{ s/h} = 3960 \text{ kJ/h}$

Capacity : 1,5 tons/h

Power : $3960 \text{ kJ/h} \times 8 \text{ h} = 31680 \text{ kJ}$

3. Brush-washing;

Diameter : 0,8 m

Length : 2,5 m

Length²: 2,65 m

Height : 2,2 m

Power : $1,5 \text{ kW} \times 3600 \text{ s/h} = 5400 \text{ kJ/h}$

Capacity : 1,5 tons/h

Power : $5400 \text{ kJ/h} \times 8 \text{ h} = 43200 \text{ kJ}$

4. Extractor;

Length : 1,74 m

Width : 1,38 m

Height : 1,71 m

Working capacity : 6-8 tons/hour

Power : $4 \text{ kW} \times 3600 \text{ s/h} = 14400 \text{ kJ/h}$

Capacity : 1,5 tons/h

Power : $14400\text{kJ/h} \cdot 8\text{h} = 115200\text{ kJ}$

5. Finisher;

Working capacity : 4000-4500 liter/h

Power : $3\text{ kW} \cdot 3600\text{s/h} = 10800\text{ kJ/h}$

Capacity : 1,5 tons/ h

Power : $10800\text{kJ/h} \cdot 8\text{h} = 86400\text{ kJ}$

6. Decanter;

Power : $5,5\text{ kW} \cdot 3600\text{s/h} = 19800\text{ kJ/h}$

Capacity = 1,5 tons/h

Power = $19800\text{kJ/h} \cdot 8\text{h} = 158400\text{ kJ}$

7. Deaeroter

Power : $9\text{ kW} \cdot 3600\text{s/h} = 32400\text{ kJ/h}$

Capacity = 1,5 tons/h

Power = $32400\text{kJ/h} \cdot 8\text{h} = 259200\text{ kJ}$

8. Pasteurizator

Feed:

Power : $1,5\text{ kW} \cdot 3600\text{s/h} = 5400\text{ kJ/h}$

Capacity = 1,5 tons/h

Power = $5400\text{kJ/h} \cdot 8\text{h} = 43200\text{ kJ}$

Hot Water:

Power :0,75 kW*3600s/h =2700 kJ/h

Capacity =1,5 tons/h

Power = 5400kJ/h*8h = 21600 kJ

$C_p=3,5$ kJ/kg.K (Geankoplis, 2003)

$T_{amb}=22$ °C

Amount of energy to heat:

$$Q = m * C_p * \Delta T$$

$$Q = 1500 \text{ kg/h} * 1\text{h}/3600\text{s} * 3500\text{J/kg.K} * (90-22) \text{ °C}$$

$$Q = 99166,6 \text{ J/s} = 99,166 \text{ kW}$$

Amount of vapor to heat:

Enthalpy of the saturated vapor at 100 °C is 2676.1 kJ/kg (Geankoplis, App-A.2-9)

$$Q = m_v * \lambda$$

$$99,166\text{kJ/s} = m_v * 2676,1 \text{ kJ/kg}$$

$$m_v = 0,037 \text{ kg/s} = 133,2 \text{ kg/h}$$

The amount of natural gas needed;

1m³ natural gas gives 39000kj energy

$$Q = m * \lambda + m * C_{p_{water}} * \Delta T$$

$$Q = 133,2 * 2676,1 + 1500 * 3,5 * 68$$

$$Q = 713456,5 \text{ kJ/h}$$

$$Q = 713456,5 / 39000 = 18,3 \text{ m}^3/\text{h} \text{ natural gas}$$

9. Homogenizator

Power :2 kW*3600s/h =7200 kJ/h

Capacity =1,5 tons/h

Power = 7200kJ/h*8h = 57600 kJ

10. Packaging unit

Power :30 kW*3600s/h =108000 kJ/h

Capacity =1,5 tons/h

Power =108000 kJ/h*8h = 864000 kJ

3. PLANT DESIGN

3.1. Plant Location

Plant location is very important. Some factors which are raw material availability, energy resources, marketing and distribution, water resource, labor availability, transportation facilities, waste disposal and site characteristics, influence the plant location. There are lots of encouragements from Government.

3.1.1. Raw material

In orange juice production, the quality and quantity of oranges are very important. We have chosen the Antalya Organizational Industrial Region because this place is closed to raw material and orange must be processed in 36 hours.

3.1.2. Marketing and distribution

The most useful way to reduce costs is selecting the plant site also according to the transportation and distribution. The factor is the cost of area and big cities. We selected our plant site in Antalya. Antalya is suitable for export. In addition, the region of Turkey has been purchased.

3.1.3. Energy and water sources

In the plant natural gas and fuel-oil steam boilers will be used. Energy will be supplied at normal conditions from the natural gas steam boiler. Fuel-oil energy will be used if there is a problem at natural gas. Electricity will be used from the installation of the organization industrial area. Also with the quantity of our workers, government gives a sold about 20–50% of electricity cost.

Water will be supplied from artesian well, and also municipality based water will be used, if we find a contamination to artesian well water from outside by the laboratory analysis, which will be made frequently. The sanitation of water will be supplied by refinery.

3.1.4. Labor availability

There is an industrial area and the point of corporation of Antalya Organizational Industrial region is to make employment for people living in Mediterranean Region. So we can easily find labors.

3.1.5. Waste disposal

Our process waste are water from cleaning unit and orange peel from extraction. Disposable water is given to Antalya Organizational Industry Region abatement thesis. Orange peel is performed in a suitable way.

3.2 Plant sketch drawing

Our business will be implemented HACCP, microbiological, physical, chemical measures will be taken against the danger. Critical control points are included in our application of HACCP were identified and will be under control.

Technical malfunctions that may be along the lines of flow in mind, the flow lines on the technical elements will be assigned.

The energy and water as required in the plant which ensured from outside designed appropriately input and output. Floor of the plant will be set up with resistance to pressure, easy to clean. This will prevent contamination between raw materials and final product in line has been designed.

Drainage system in our factory is set up insinuatingly and prevent possible contamination.

Plant sketch drawing is shown in appendix 2, appendix 3 and appendix 4.

3.3.Plant Site

The plant will be built in Antalya, in Organizational Industrial Region, with area of 10000m² which has 7000m² closed area and 3000m² opened area. Minimum cost of production and distribution can be obtained because of availability transportation of raw material from region of Antalya. Also the cost of area is 35 USD dollars for 1m². So it is suitable for our organization.

4. DISCUSSION

This is a preliminary design report for orange juice. It has been decided to locate the plant in Antalya Organizational Industrial Region. The raw material is also obtained from Antalya.

The plant closed area is 7000 m² and total area is 10000m². The production department, product storage, cafeteria, laboratory and management departments are in closed area. Security, car park, green areas are in opened area.

Planned capacity of plant is 12 tons per day. It has been decided that there will be 1 shift for one day, each shift working hours are 10. Total work will be done 6 days per a week.

Number of workers will be 43, including managerial unit. There are one shift, between 09.00–19.00. There will be;

- ✓ 1 manager,
- ✓ 1 Quality Manager,
- ✓ 2 Accountants,
- ✓ 4 technician of process,
- ✓ 2 technician of maintenance
- ✓ 2 technician of analysis,
- ✓ 1 Personnel Manager,
- ✓ 1 Production Manager,
- ✓ 1 Secretary ,
- ✓ 2 Food Engineer,
- ✓ 2 Security,
- ✓ 4 Cleaning personnel.
- ✓ 20 Workers

We have decided to produce orange juice in our plant with a capacity of 12 tons per a day. Approximately, we aim to produce 1500 kg per hour orange juice from orange. 7 tons/day of the raw material will be sold as 100% orange juice, 5 tons/day will be used for concentrated orange juice production.

For energy supply electricity, natural gas and fuel-oil will be used. The floor is isolated with a layer waterproof and resistance to chemicals. It is decided to locate graded for drainage. It is thought that the walls are covered with wall tile for washing efficiently and connections points of walls and floors should be curved.

Evaluation of our plant installation costs is performed according to labor supply, water and energy availability, freight of transportation, raw material and market, equipments costs, plant area, taxation, waste disposal. Break event point will be calculate keep in mind these factors.

5. CONCLUSION

This is a preliminary design report for a plant producing orange juice. It has been decided to locate the plant in Antalya.

The plant total area is 10000m². The production department, product storage, cafeteria, laboratory and personnel departments are in closed area. Security, car park, green areas are in opened area.

Planned capacity of plant is 1500 kg/hour. It has been decided that there will be 1 shift for one day, each shift working hours are 10. The work will be done 6 days in a week.

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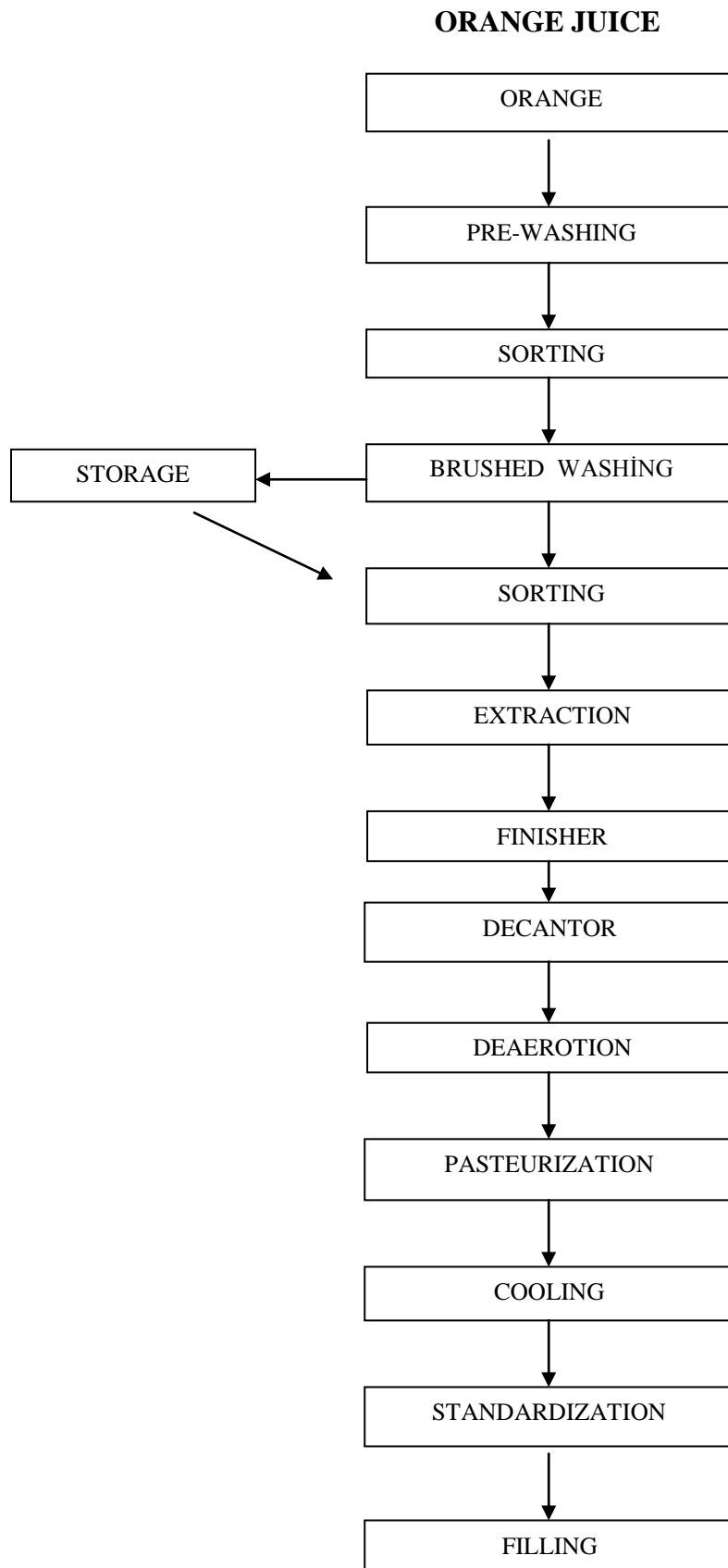
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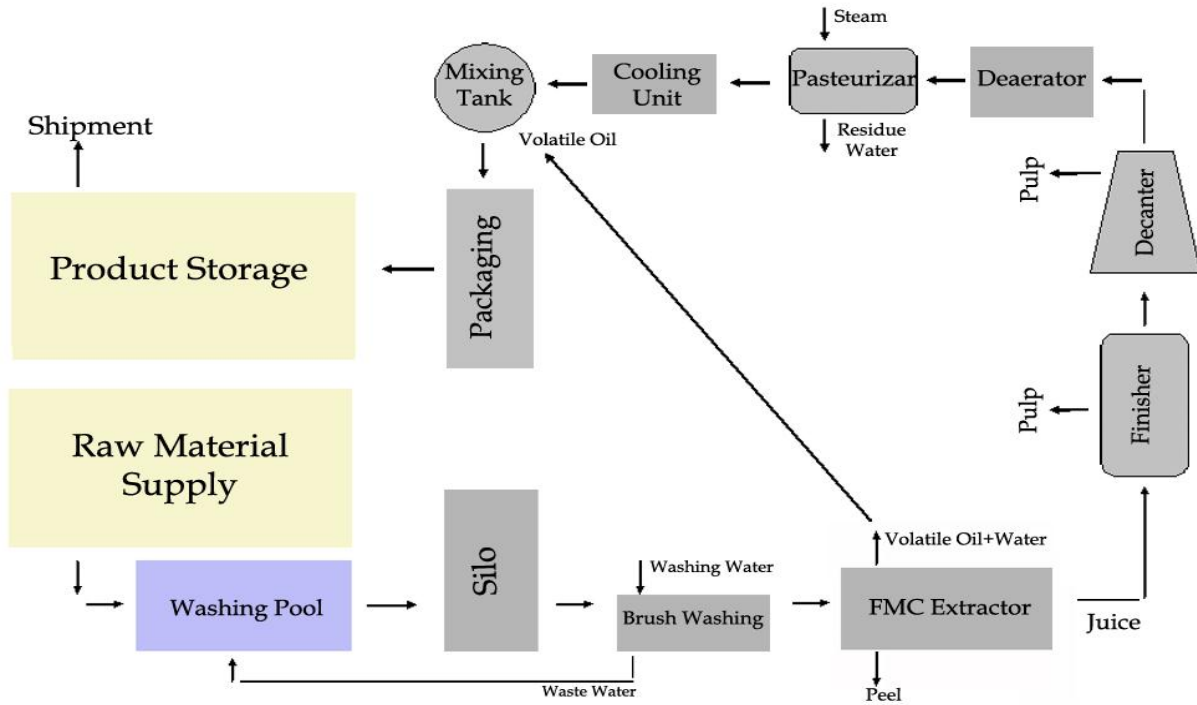
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7. APPENDIX

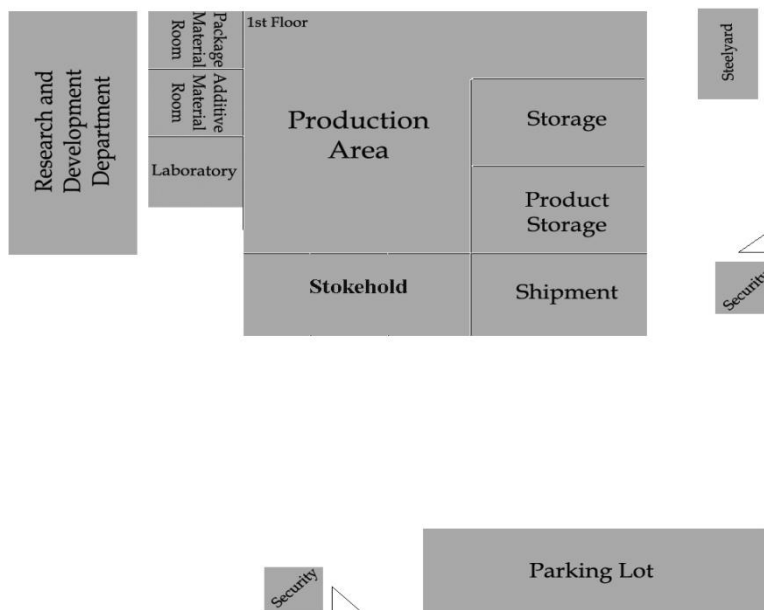
7.1. Appendix 1



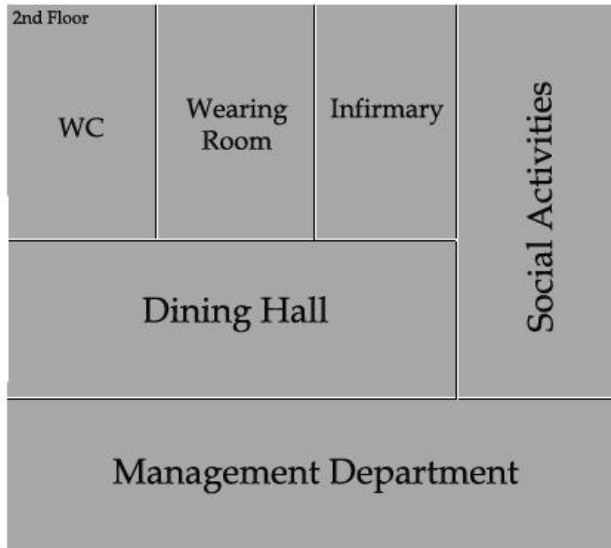
7.2. Appendix 2



7.3. Appendix 3



7.4. Appendix 4



7.5. Appendix 5

Yayımlandığı R.Gazete: 30.12.2006-26392

Tebliğ No: 2006/56

Amaç

MADDE 1 – (1) Bu Tebliğin amacı; meyve suyu ve benzeri ürünlerin tekniğine uygun ve hijyenik şekilde üretim, hazırlama, işleme, muhafaza, depolama, taşıma ve pazarlanmasını sağlamak üzere bu ürünlerin özelliklerini belirlemektir.

Kapsam

MADDE 2 – (1) Bu Tebliğ; meyve suyu, konsantreden üretilen meyve suyu, meyve suyu konsantresi, meyve suyu tozu, meyve nektarı, meyve püresi ve meyve püresi konsantresini kapsar.

Hukuki dayanak

MADDE 3 – (1) Bu Tebliğ, 16/11/1997 tarihli ve 23172 mükerrer sayılı Resmî Gazete’de yayımlanan "Türk Gıda Kodeksi Yönetmeliği"ne göre hazırlanmıştır.

Tanımlar

MADDE 4 – (1) Bu Tebliğde geçen;

- a) Bal: "Türk Gıda Kodeksi Bal Tebliği"ne uygun balları,
- b) Konsantreden üretilen meyve suyu: Meyve suyu konsantresine, su ve işleme sırasında ayrılan aromanın ve gerektiğinde pulp ve meyve keseciklerinin tekrar kazandırılmasıyla elde edilen ürünü,
- c) Meyve: Bu Tebliğde kapsamında yer alan ürünlerin üretilmesi için gerekli özelliklere sahip domates hariç tüm meyveleri,
- ç) Meyve nektarı: Meyve suyuna, konsantreden üretilen meyve suyuna, meyve suyu konsantresine, meyve suyu tozuna, meyve püresine veya bunların karışımına, su ve şekerlerin ve/veya balın ilave edilmesiyle elde edilen, EK-3'de belirtilen hükümlere uygun, fermente olmamış ancak fermente olabilen ürünü,
- d) Meyve püresi: Suyunu uzaklaştırmadan, bütün veya kabuğu soyulmuş meyvenin yenilebilen kısmının elekten geçirilmesiyle elde edilen, fermente olmamış ancak fermente olabilen ürünü,
- e) Meyve suyu: Sağlam, olgun, taze veya soğukta muhafaza edilmiş meyvelerden, tek meyveden veya daha fazla meyvenin karışımından elde edilen, elde edildiği meyve ve meyvelerin karakteristik renk, aroma ve tadına sahip, fermente olmamış ancak fermente olabilen ürünü,
- f) Meyve suyu konsantresi: Bir veya daha fazla meyveden elde edilen meyve suyundan, fiziksel yollarla suyun belirli oranlarda uzaklaştırılmasıyla elde edilen ürünü,
- g) Meyve suyu tozu: Bir veya daha fazla meyveden elde edilen meyve suyundan, fiziksel yollarla suyun olabildiğince ayrılması ile elde edilen ürünü,
- ğ) Meyve püresi konsantresi: Meyve püresindeki suyun belirli bir kısmının fiziksel yollarla uzaklaştırılması ile elde edilen ürünü,
- h) Pulp veya meyve kesecikleri: Suyunu uzaklaştırmadan aynı meyvenin yenilebilen kısımlarından elde edilen ürünü, turunçgil meyveleri için ise meyve etinden elde edilen meyve suyu keseciklerini,
- ı) Şeker: Meyve nektarı, konsantreden üretilen meyve suyu ve meyve suyu üretiminde kullanılan "Türk Gıda Kodeksi Şeker Tebliği"ne uygun şekerler,

ifade eder.

Ürün özellikleri

MADDE 5 – (1) Bu Tebliğ kapsamındaki ürünlere ait özellikler aşağıda verilmiştir:

- a) İşleme sırasında ayrılan aroma, pulp ve meyve kesecikleri aynı meyve suyuna geri kazandırılabilir.

b) Konsantreden üretilen meyve suyuna ilave edilecek olan aroma, pulp ve meyve keseciği, aynı tür meyveden elde edilmelidir. Ancak meyve suyuna ilave edilecek olan aroma, pulp ve meyve keseciği söz konusu meyve suyunun üretimi sırasında ayrılan aroma, pulp ve meyve keseciği olmalıdır. Sadece üzüm suyuna tartarik asit tuzları geri kazandırılabilir.

c) Turunçgil meyve sularında, meyve suyu meyve etinden gelmelidir.

ç) Misket limonu suyu, kabuk oranı uygun işlemlerle en az seviyede tutulacak şekilde tüm meyveden elde edilir.

d) Konsantreden elde edilen meyve sularına ilave edilecek su, meyve suyunun kalitesini etkilemeyecek şekilde, özellikle duyuşal, mikrobiyolojik ve kimyasal bakımdan uygun özelliklerde ve "İnsani Tüketim Amaçlı Sular Hakkında Yönetmeliğe" uygun olmalıdır.

e) Konsantreden elde edilen meyve suyunun duyuşal ve analitik özellikleri, aynı meyveden doğrudan elde edilen ve Madde 4 (b) bendinde tanımlanan meyve suyunun niteliklerinden daha düşük olmamalıdır.

f) Doğrudan tüketime sunulan meyve suyu konsantrelerinde, suyun en az %50'si uzaklaştırılmış olmalıdır.

g) Meyve nektarına şeker, fruktoz şurubu, meyve türevli şekerler ve bal eklenebilir. Ancak ilave edilen şeker ve/veya bal son ürünün toplam ağırlığının %20'sinden fazla olmamalıdır.

ğ) Konsantreden üretilen meyve suyuna şeker ve fruktoz şurubu eklenebilir.

h) Meyve suyu üretiminde şeker kullanılabilir ancak kullanılacak şekerin su oranı %2'den düşük olmalıdır.

ı) Sadece şekersiz veya düşük enerjili olarak üretilen meyve nektarlarında şeker yerine, tamamen veya kısmen "Türk Gıda Kodeksi Gıda Maddelerinde Kullanılan Tatlandırıcılar Tebliği"ne uygun tatlandırıcılar kullanılabilir.

i) Madde 4 (e) bendinde yer alan meyve nektarı tanımı dikkate alınmaksızın, kayısı ve EK-3'ün 2. ve 3. kısımlarında yer alan meyveler, tek başlarına veya birbiriyle karıştırılarak şeker, bal ve/veya tatlandırıcı ilave etmeksizin nektar üretiminde kullanılabilir.

j) Armut ve üzüm dışındaki meyvelerden elde edilen meyve suyu, konsantreden üretilen meyve suyu, meyve suyu konsantresi ve meyve suyu tozuna şeker ilave edildiği durumlarda kuru madde olarak ifade edilen şeker içeriği;

- Asitliliği düzenlemek için eklenecekse, 15 g/l

- Tatlandırıcı olarak kullanılacaksa 150 g/l'yi

geçmemelidir.

k) İlave edilecek olan şeker, hem asitliliği hem de tadı düzenlemek amacıyla kullanılacaksa 150 g/l'den fazla olmamalıdır.

l) Meyve suyu üretiminde limon suyu/limon suyu konsantresi veya asitliliği düzenleyici maddeler, şeker ile birlikte kullanılamaz.

m) Meyve suyu, konsantreden üretilen meyve suyu, meyve suyu konsantresi, meyve suyu tozu ve meyve nektarı üretiminde asitliği düzenlemek amacıyla, meyve suyuna susuz sitrik asit cinsinden en fazla 3 g/l limon suyu ve/veya limon suyu konsantresi ilave edilebilir.

n) Bu Tebliğ kapsamında yer alan ürünlerde, gıda maddelerinde kullanılabilir özellikte karbondioksit kullanılabilir.

o) Meyve suyu ve püresinde;

1) etil alkol miktarı ağırlıkça 3 g/l

2) uçucu asitler miktarı 0.4 g/l

3) laktik asit 0.5 g/l'den fazla olmamalıdır. Meyve nektarlarında EK-3'deki meyve oranları dikkate alınmalıdır.

ö) Meyve suyu, konsantreden üretilen meyve suyu, meyve suyu konsantresi, meyve suyu tozu ve meyve nektarı üretiminde uygulanacak işlemler ve işlem yardımcıları EK-1'de verilmiştir.

p) Meyve suyu, konsantreden üretilen meyve suyu, meyve suyu konsantresi, meyve suyu tozu ve meyve nektarı ile ilgili özel isimlendirmeler EK-2'de verilmiştir.

r) Meyve suyu ve püresi için minimum briks değerleri ve meyve nektarlarına ait minimum meyve oranları Ek-3'te verilmiştir.

Katkı maddeleri

MADDE 6 – (1) Bu Tebliğ kapsamında yer alan ürünlerde kullanılan katkı maddeleri, tatlandırıcılar ve renklendiriciler "Türk Gıda Kodeksi Yönetmeliği"nin Katkı Maddeleri Bölümüne uygun olmalıdır. Ayrıca;

Bu Tebliğin 1 nolu ekinde bahsedilen kükürtdioksit ile kükürtleme işlemi yapılan üzümün kullanıldığı üzüm suyunda kükürtdioksit miktarı 10 mg/L'den fazla olmamalıdır.

Bulaşanlar

MADDE 7 – (1) Bu Tebliğ kapsamında yer alan ürünlerdeki bulaşanların miktarları, "Türk Gıda Kodeksi Yönetmeliği"nin Bulaşanlar Bölümüne uygun olmalıdır.

Pestisit kalıntıları

MADDE 8 – (1) Bu Tebliğ kapsamında yer alan ürünlerdeki pestisit kalıntı miktarları, "Türk Gıda Kodeksi Yönetmeliği"nin Pestisit Kalıntıları Bölümüne uygun olmalıdır.

Veteriner ilaçları tolerans düzeyi

MADDE 9 – (1) Bu Tebliğ kapsamında, bileşiminde bal içeren ürünlerde bulunabilecek veteriner ilaçları kalıntı miktarları, "Türk Gıda Kodeksi Yönetmeliği"nin Veteriner İlaçları Tolerans Düzeyleri Bölümüne uygun olmalıdır.

Hijyen

MADDE 10 – (1) Bu Tebliğ kapsamında yer alan ürünler, "Türk Gıda Kodeksi Yönetmeliği"nin Gıda Hijyeni Bölümünde yer alan genel kurallara uygun olarak üretilmelidir.

Ambalajlama, etiketleme ve işaretleme

MADDE 11 – (1) Bu Tebliğ kapsamında yer alan ürünlerin ambalajlanması, etiketlenmesi ve işaretlenmesinde "Türk Gıda Kodeksi Yönetmeliği"nin Ambalajlama – Etiketleme ve İşaretleme Bölümünde yer alan genel kuralların yanı sıra aşağıdaki kurallara da uyulmalıdır.

- a) Tebliğde yer alan ürünlerin satış isimleri tanımlarda yer alan isimlendirmeler olmalıdır. Ayrıca buna alternatif olarak EK-2’de yer alan isimler de kullanılabilir. Bu isimler ekte belirtilen koşullarda ve dilde olmalıdır.
- b) Eğer ürün tek bir çeşit meyveden elde ediliyorsa, ürün ismindeki "meyve" ifadesi yerine söz konusu meyvenin adı kullanılmalıdır.
- c) İki veya daha fazla meyveden elde edilen ürünlerde, limon suyunun asitliği ve/veya tadı düzenlemek amacıyla kullanıldığı durumlar haricinde, ürün ismi kullanılan meyve suyunun veya pürenin azalan hacimlerine göre meyve isimleriyle desteklenmelidir.
- ç) Üç veya daha fazla meyveden elde edilen ürünlerde meyvelerinin isimleri yerine "karışık" veya aynı anlama gelen bir ifade ya da kullanılan meyve sayısını belirterek ifade edilmelidir. Ürün ismi kullanılan meyve suyunun veya pürenin azalan hacimlerine göre meyve isimleriyle desteklenmelidir.
- d) Şeker ilave edilerek tatlandırılan meyve sularında, satış ismi "Tatlandırılmış" veya "Şeker İlave Edilmiş" ifadesini içermeli ve kullanılan şeker miktarı g/l olarak bu ifadenin devamında yer almalıdır.
- e) Meyve suyu, konsantreden üretilen meyve suyu, meyve suyu konsantresi, meyve suyu tozu ve meyve nektarının restorasyonu için geri kazandırılması gerekli maddelerin etiket üzerinde belirtilmesi zorunlu değildir. Ancak, meyve suyuna ekstra ilave edilen pulp veya meyve kesecikler etikette belirtilmelidir.
- f) Meyve suyu ve nektarı konsantreden elde edilmiş ise "konsantreden üretilmiştir", eğer konsantre ile meyve suyu yada püresinin karışımından elde edilmiş ise "kısmen konsantreden üretilmiştir" ifadesi etiket üzerinde, ürün ismine yakın olarak yer almalıdır.
- g) Meyve nektarları için, meyve suyu, meyve püresi veya bunların karışımının minimum miktarları, etiket üzerinde, meyve suyu veya meyve püresi cinsinden "meyve oranı en az %" ifadesi ile belirtilmelidir. İfade ürün ismi ile aynı yüzeyde olmalıdır.

ğ) Meyve suyu konsantresi eğer son tüketiciye sunulmayacaksa etiket bilgilerine ek olarak, etiket üzerinde ilave edilen şekerlerin, limon suyunun veya "Türk Gıda Kodeksi Renklendiriciler ve Tatlandırıcılar Dışındaki Gıda Katkı Maddeleri Tebliği"ne uygun asitliği düzenleyici maddelerin varlığı ve miktarları belirtilmelidir. Bu bilgiler ambalaj üzerinde, etikete iliştilmiş olarak veya ayrı bir belge olarak verilebilir.

Taşıma ve depolama

MADDE 12 – (1) Bu Tebliğde yer alan ürünlerin depolanması ve taşınmasında, "Türk Gıda Kodeksi Yönetmeliği"nin Gıdaların Taşınması ve Depolanması Bölümündeki kurallara uyulmalıdır.

Numune alma ve analiz metotları

MADDE 13 – (1) Bu Tebliğde yer alan ürünlerin üretim hattından ve muhafaza deposundan numune alınmasında "Türk Gıda Kodeksi Yönetmeliği"nin Numune Alma ve Analiz Metotları Bölümündeki kurallara uyulmalıdır. Numune, uluslar arası kabul görmüş metotlarla analiz edilmelidir.

Avrupa Birliğine uyum

MADDE 14 – (1) Bu Tebliğ, 2001/112/EEC sayılı "Meyve Suları ve Benzeri Ürünlere ilişkin Konsey Direktifi" dikkate alınarak Avrupa Birliğine uyum çerçevesinde hazırlanmıştır.

Avrupa Birliğine bildirim

MADDE 15 – (1) Bu Tebliğ "Teknik Mevzuatın ve Standartların Türkiye ile Avrupa Birliği Arasında Bildirimine Dair Yönetmelik" kapsamında Avrupa Birliği Komisyonu'na bildirilmiştir.

Tescil ve denetim

MADDE 16 – (1) Bu Tebliğde yer alan ürünleri üreten ve satan işyerleri, tescil ve izin, ithalat, kontrol ve denetim sırasında bu Tebliğ hükümlerine uymak zorundadır. Bu hükümlere uymayan işyerleri hakkında 5/6/2004 tarihli ve 25483 sayılı Resmî Gazete'de yayımlanan 5179 sayılı "Gıdaların Üretimi, Tüketimi ve Denetlenmesine Dair Kanun Hükmünde Kararnamenin Değiştirilerek Kabulü Hakkında Kanun" hükümlerine göre yasal işlem yapılır.

Denetim

MADDE 17 – (1) Bu Tebliğe ait hükümler; 5/6/2004 tarihli ve 25483 sayılı Resmî Gazete'de yayımlanan 5179 sayılı "Gıdaların Üretimi, Tüketimi ve Denetlenmesine Dair Kanun Hükmünde Kararnamenin Değiştirilerek Kabulü Hakkında Kanun"a göre, Tarım ve Köyişleri Bakanlığı'nca denetlenir.

Yürürlükten kaldırılan mevzuat

MADDE 18 – (1) Bu Tebliğle, 9/6/1998 tarih ve 23367 sayılı Resmî Gazete'de yayımlanan "Türk Gıda Kodeksi Meyve Suyu ve Benzeri Ürünler Tebliği" yürürlükten kaldırılmıştır.

GEÇİCİ MADDE 1 – (1) Halen faaliyet gösteren ve bu Tebliğ kapsamında yer alan ürünleri üreten ve satan işyerleri 1 yıl içinde Tebliğ hükümlerine uymak zorundadır. Bu süre içinde gerekli düzenlemeleri yapmayan işyerleri ve satış yerlerinin faaliyetlerine izin verilmez. Bu sürenin sonunda söz konusu üretim yerleri ile Tebliğ hükümlerine uymayan ürünleri satan işyerleri hakkında, 5179 sayılı "Gıdaların Üretimi, Tüketimi ve Denetlenmesine Dair Kanun Hükmünde Kararnamenin Değiştirilerek Kabulü Hakkında Kanun" hükümlerine göre yasal işlem yapılır.

Yürürlük

MADDE 19 – (1) Bu Tebliğ yayımı tarihinde yürürlüğe girer.

Yürütme

MADDE 20 – (1) Bu Tebliğ hükümlerini Tarım ve Köyişleri Bakanı yürütür.

EK - 1

Üretim Sırasında Uygulanabilecek İşlemler ve İşlem Yardımcıları

- a) Mekanik Ekstraksiyon İşlemleri
- b) Fiziksel İşlemler : Meyve suyu ve konsantreden üretilen meyve suyunun oluşturulmasında kullanılan meyve suyu konsantresi üretiminde, üzüm haricindeki diğer meyvelerin yenilebilen kısımlarından suyun ekstraksiyon işlemi gibi
- c) Kükürtleme işlemi uygulanan meyvelerden elde edilen üzüm suyuna, son ürünlerdeki toplam kükürdioksit miktarı 10 mg/L'yi geçmeyecek şekilde fiziksel desülfitleme işlemi uygulanabilir.
- ç) Pektolitik enzim
- d) Proteolitik enzim
- e) Amilolitik enzim
- f) Yenilebilen jelatin
- g) Tanin
- ğ) Bentonit
- h) Silikon aerojel
- ı) Aktif kömür

i) Türk Gıda Kodeksinde gıda maddeleri ile temasına izin verilen, kimyasal inert filtrasyon yardımcıları ve perlit, yıkanmış diatomin, selüloz, çözünmeyen poliamid, polivinilpolipirolidon, polisitren gibi çökelti ajanları

j) Gıda maddeleri ile temasına izin verilen, turunçgil meyve sularında limonoid glukositler, asit, oligosakkaritler de dahil olmak üzere şekerler ve mineral içeriği önemli derecede etkilemeden, limonoid ve narancin içeriğini azaltmak için kullanılan kimyasal inert adsorpsiyon yardımcıları.

EK - 2

Meyve Suyu, Konsantreden Üretilen Meyve Suyu, Meyve Suyu Konsantresi, Meyve Suyu Tozu ve Meyve Nektarı İçin Özel İsimler

a) Vruchtendrank : Meyve nektarları için

b) Süßmost

Süßmost ismi “Fruchtsaft” veya “Fruchtnektar” ürün isimleri ile bir arada kullanılabilir.

1) Sadece meyve suyundan, meyve suyu konsantrelerinden veya bunların karışımından elde edilen, doğal hallerinde yüksek miktarda asit olduğundan doğal olarak tüketilemeyen meyve nektarı için,

2) Uygunsa elma karıştırılan ama şeker eklenmemiş armut suyu için,

c) “succo e polpa” veya “somo e polpa” : Sadece meyve pürelerinden ve/veya meyve püresi konsantresi konsantrelerinden elde edilen meyve nektarları için,

ç) “æblemost” : Şeker ilave edilmemiş elma suları için

1) “sur saft” : Siyah kuş üzümünden, kirazdan, kırmızı kuş üzümünden, beyaz kuş üzümünden, ahudududan, çilekten veya mürver meyvelerden elde edilen şeker ilave edilmemiş meyve sularında, Danimarka dilinde meyve isimleriyle birlikte kullanılır.

2) “sød saft” veya “sødet saft” bir litresine 200 gramdan fazla şeker ilave edilen meyve sularında, Danimarka dilinde o meyve ismiyle birlikte kullanılır.

d) “äpplemust” : Şeker eklenmemiş elma suları için

e) “mosto” : Üzüm suyu

EK – 3

Meyve Suyu ve Püresi için Minimum Briks değerleri ve Meyve Nektarları için Minimum Meyve Oranları

1). Asidik suyuyla birlikte doğal olarak tüketilemeyen meyveler

Meyvenin Adı	Botanik Adı	Konsantreden seyreltilen meyve suyu ve püresi için minimum briks derecesi	Meyve nektarında minimum meyve suyu ve/veya püresi miktarı (Son üründe % hacim olarak)
Çarkıfelek/Pasion meyvesi	<i>Passiflora quadrangulari</i>	13.5	25
Lulo	<i>Salnum quitoeuse</i> Lam.		25
Siyah frenk üzümü	<i>Ribes nigrum</i> L.	11.0	25
Beyaz frenk üzümü	<i>Ribes rubrum</i> L.	10	25
Kırmızı frenk üzümü	<i>Ribes rubrum</i> L.	10.0	25
Bektaşî üzümü	<i>Ribes uva-crispa</i> L.	7.5	30
Yabani iğde	<i>Hippohae rhamnoides</i> L.	6.0	25
Çakal eriği	<i>Prunus spinosa</i> L.	6.0	30
Erik	<i>Prunus domestica</i> L.	12.0	30
Mürdüm eriği	<i>Prunus domestica</i> L.subsp. <i>domestica</i>	12.0	30
Kuş Üvezi	<i>Sorbus aucuparia</i> L.	11.0	30
Kuşburnu	<i>Rosa sp.</i> L.	9.0	40
Vişne	<i>Prunus cerasus</i>	14.0	35
Diğer kirazlar	<i>Prunus avium</i>		40

Yaban mersini	<i>Vaccinium myrtilus corymbosum</i> <i>L. Angustifolium</i>	10.0	40
Mürver yemişi	<i>Sambucus nigra L.canadensis</i>	10.5	50
Ahududu	<i>Rubus occidentalis L./R.idaeus L.</i>	11.1	40
Kayısı	<i>Prunus armeniaca L.</i>	11.5	40
Çilek	<i>(Fragaria ananassa chiloensis virginian)</i>	7.5	40
Karadut/Böğürtlen	<i>Morus sp./Rubus furitcosus L.</i>		40
Bataklık yaban mersini	<i>Vaccinium macrocarpon Aiton</i> <i>Vaccinium oxycoccos L.</i>	7.5	30
Ayva	<i>Cydonia oblonga Mill.</i>	11.2	50
Limon ve misket limonu	<i>Citrus limon (L.) Burm. & citrus auranti folia</i>	8.0	25
Bu kategoriye ait diğer meyveler			25

2). Suyuyla birlikte doğal olarak tüketilmeyen düşük asitli, pulpumsu kıvamda veya yüksek miktarda aromalı meyveler

Mango/ Hintkirazı	<i>Mangifera indica L.</i>	13.5	25
Muz	<i>Musa species M.acuminata ve M.paradisiaca)</i>		25
Guava	<i>Psidium guajava L.</i>	8.5	25
Papaya /kavun ağacı	<i>Carica papaya L.</i>		25
Liçi	<i>Litchi chinensis Sonn.</i>	11.2	25
Azerola	<i>Malpighia sp.(Moc.&Sesse)</i>	6.5	25
Sursop	<i>Annona muricata L.</i>	14.5	25
Kustard elması	<i>Annona muricata L.</i>		25
Hint ayvası	<i>Annona squamosa L</i>	14.5	25

Nar	<i>Punica granatum L.</i>	12.0	25
Kaşev fıstığı	<i>Anacardium occidentole L.</i>	11.5	25
İspanyol / Avrupa eriği	<i>Spondias tuberosa Arruda</i>		25
Umbu		9.0	25
Bu kategoriye giren diğer meyveler			25

3). Suyuyla beraber doğal olarak tüketilebilen meyveler

Elma	<i>Malus domestica Borkh.</i>	11.5	50
Armut	<i>Pyrus communis L.</i>	12.0	50
Şeftali	<i>Prunus persica L</i>	10.5	50
Limon ve Misket limonu dışındaki turunçgiller			50
Ananas	<i>Ananas comosus L sativis</i>		50
Bu kategoriye giren diğer meyveler			50

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- [Üyesi Bulduğumuz Kuruluşlar](#) 1
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