

CHARACTERISTICS OF THE PRODUCT

FUNCTIONAL NUTRACEUTICAL BEVERAGE

YOUTH JUICE®

This product was developed on the basis of some of the research findings of the project

On

"Physiological and Nutraceutical Characteristics of BC Wild Berries and Small Fruits"

Funded by

The Investment Agriculture Foundation of British Columbia

/Agriculture and AgriFood Canada

The original Studies were conducted by

Dr. J. Ranatunga in collaboration with Agriculture and AgriFood

Canada, Pacific Agriculture Research Centre (PARC) Summerland BC

J. Ranatunga Ph.D.

May 2007

<http://thenewyj.com/activate>

This report is compiled to provide detailed information about the functional and nutraceutical beverage; "Youth Juice®". The report focuses on the scientific bases of design and development of the product, descriptions of component ingredients, biochemical and nutraceutical aspects of the product and the functional and nutritional benefits of the product.

The product can be categorized as a functional and nutraceutical beverage and is rich in carefully selected berry juices taken from seven different fresh whole berries, combined with vitamins, minerals and powerful seaweed extracts together with natural ellagitannin and fucoidan rich extracts. Based on science supported evidence, Youth Juice® can be recommended as a nutraceutical beverage for the promotion and maintenance of good health and in reducing oxidative stress in humans. The product also delivers a range of phytochemicals proven to be effective in reducing the risk of cancer, prevention from heart disease, hypertension, diabetes and asthma. The primary strategic objective of the product design was to boost the immune system to produce antibodies to protect cells from cancer, and other diseases. This objective was achieved through combining a range of natural antioxidants, fibers, vitamins and minerals especially Zinc together with carefully selected seaweed extracts in the formula. Youth Juice® also can be introduced as a powerful and well balanced antioxidant blend which contains a range of powerful antioxidants representing all classes of phytochemicals especially those rich in antioxidant properties.

When designing the formula special attention was taken to enhance the ability of the product to fight against cancer. This was achieved by the inclusion of a range of biologically active phytochemical groups namely anthocyanins, flavonols, proanthocyanidins, phenolic acids and ellagic acid in the formula. The product was also designed to deliver, therapeutic dosages of ellagitannins (40mg), studied for their cancer fighting properties, from 6 ozs per day.

In order to achieve the highest bioavailability of ellagic acid, the Youth Juice production conditions were optimized in a way to facilitate enzymatic and acid hydrolysis of ellagitannins (which are too large to be

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absorbed into the circulatory system) to generate ellagic acid which can be readily absorbed into the blood stream. The conversion of naturally found ellagitannins into ellagic acid and the bioavailability of ellagic acid were further strengthened by combining ellagic acid with berry puree rich with phenolics and other phytochemicals.

Blackcurrant and Boysenberry whole berry juice are among the key ingredients in Youth Juice®. According to recent research findings the anthocyanins and polyphenols found in blackcurrant and Boysenberries have a strong protective effect against the cause of Alzheimer's. According to research findings blackcurrant and Boysenberries may prevent or significantly delay the onset of Alzheimer's.

The product is designed to deliver 100% of the Daily Recommended Intake (DRI) of most of vitamins and minerals. The product contains an excellent blend of minerals and vitamins required for bone health. The presence of natural vitamin K, also enhances the ability of the product to support bone health. Vitamin K is a beneficial nutrient for bone health by influencing the synthesis and extraction of osteocalcin, the synthesis of interleukin 1 and 6, bone mineral density and fracture rate. Vitamin C and E improve blood vessel function, an important indicator of cardiovascular health, restore endothelial function and retard the progression of atherosclerosis in hyperlipidemic children. Vitamin C is also important for maintenance of normal connective tissue, wound healing and bone formation. In addition vitamin C aids in iron absorption, enhances the utilization of folic acid and protects vitamin A and E from oxidation.

In order to maintain a healthy weight and to control insulin levels, the trace element chromium is also included in the formula. Chromium is considered an essential micro element for human metabolism because of its involvement in insulin function and lipid metabolism. Chromium stabilizes blood sugar and lowers insulin resistance thereby showing positive effects on cardiovascular and type II diabetes risk factor. The combining of molybdenum helps provide relief to asthmatics, and high fiber content of the product can contribute to water absorption capabilities and nutritional enhancement.

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In conclusion Youth Juice® is a synergistic blend of the most potent phyto-nutrients with multifunctional health benefits, derived from seven different whole berries namely; Blackberry, Blackcurrant, Blueberry, Boysenberry, Cranberry, Elderberry and Raspberry. The product is further strengthened by combining ellagic acid rich raspberry seed extracts, which are clinically proven to be effective in fighting various types of cancer and Fucoidan rich extracts from seaweeds which are highly effective in providing an array of functional health benefits including improved immunity, decreased cholesterol, and control of diabetes. In addition, the product is combined with two other carefully selected seaweed extracts to bring their nutritional and medicinal properties to the product. Finally this innovative and science based nutritional berry drink with multifunctional health benefits is fortified with highly soluble vitamins and minerals, to fill the gap between vitamins and minerals provided by whole berries and seaweed extracts and the daily requirements of these nutrients to maintain good health and wellbeing.

CHARACTERISTICS OF THE PRODUCT

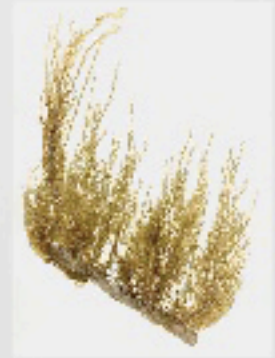
CHARACTERISTICS	IDENTITY/SPECIFICATIONS
Consistency	Thick pulpy liquid
Color	Deep reddish purple
Aroma	Fruity
Taste	Fruity, sour and mild sweet
pH	3.8-4.0
Package	946mL in transparent PET bottles, induction seal capped, headspace filled with nitrogen for maximum freshness
Shelf life	18 months from the date of manufacture
Storage	Refrigerate once opened

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YOUTH JUICE IS ENRICHED WITH SEAWEED EXTRACTS

Fucoidan from *Cladosiphon* spp

- Improve immunity by increasing the production of natural killer cells (NK Cells)
- Helps stop formation of cancer cells through an apoptosis process
- Decrease cholesterol levels
- Diabetes control by slowing down the release of glucose into blood
- Lower blood pressure
- Helps prevent arteriosclerosis
- Skin rejuvenates through the increased production of integrin, a protein that helps in skin repair and improved firmness
- Improve hair condition
- Relieve allergies through the increased NK cells
- Relieve arthritis by promoting the production of fibronectin which helps keep joints flexible and lubricated



Soeda et al (1995): *Biochimica et Biophysica Acta* 1269 (1995):85-90

Chong and Parish (1986) *Immunology* (58):277-284

Murphy-Ullrich and Hook (1989), *The Journal of Cell Biology* (109):1309-1319

Fucus gardneri extracts

- Source of polysaccharides, dietary fibers and fucoidan
- Anti-thrombotic, anti-coagulant, anti-cancer, anti-viral and anti-inflammatory properties
- Rich source of minerals including very high content of iodine
- Traditionally used to treat thyroid goiter (Suzuki et al., 1965)



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- Rich source of amino acids
- Source of Vitamin B12, C, E
- Extracts contains polyphenols derived from Phlorotannins which have a range of biological activities
- Rich source of carotenoids (b-carotene, fucoxanthin, violaxanthin)
- Helps prevents from many diseases linked to oxidative stress

Nutritional value of seaweeds *Patricia Burtin* [www://ejeafche.uvigo.es/2\(4\)2003/017242003F.htm](http://www.ejeafche.uvigo.es/2(4)2003/017242003F.htm)

Ulva lactuca extracts (green seaweeds)

- Excellent natural source for minerals, vitamins and amino acids
- Traditionally used for the treatment of CHaD (Chronic hand dermatitis) at the dosage of 9-13g/day
- According to Dr. Susan M. Lark MD., who specialized in preventive medicine and clinical nutrition, green seaweeds detoxify the kidneys and liver, and inhibit the growth of fungi, bacteria and yeast
- Helps weight loss
- Helps improve immune system
- Helps fight against breast cancer



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Vitamin contents of whole berries /100g of puree

Vitamins	Blackberry	Blackcurrant	Blueberry	Boysenberry ^b	Cranberry	Elderberry	Raspberry
Vitamin-A	200IU	28IU	62IU	-	54IU	600IU	30IU
Vitamin-C	19mg	163mg	10.0mg	3.1mg	12mg	6-25mg	26mg
Vitamin-E	1.12mg	2.2mg	0.66mg	0.45mg	0.94mg	1mg	0.75mg
Vitamin-K	18.8mcg	30mcg	22.4mcg		4.8mcg		7.6mcg
Vitamin-B1 (Thiamin)	0.019mg	0.05mg	0.043mg	0.053mg	0.02mg	0.07mg	0.03mg
Vitamin-B2 (Riboflavin)	0.024mg	0.07mg	0.047mg	0.037mg	0.02mg	0.06mg	0.04mg
Vitamin-B3 (Niacin)	0.613mg	0.4mg	0.485mg	0.767mg	0.1mg	0.5mg	0.7mg
Vitamin-B5 (Pantothenic)	0.262mg	na	0.144mg	0.25mg	0.2mg	0.14	0.3mg
Vitamin-B6 (Pyridoxine)	0.028mg	0.08mg	0.06mg	na	0.06mg	0.23mg	0.5mg
Folic acid	24mcg	7.7mcg	7.2mcg	63.3mcg	2mcg	6mcg	26mcg

Source: USDA National Nutrient Database for Standard Reference^b Nutraceutical Bulletin, Volume 3 (1); 1999 ORBC Nutraceutical Information

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MAJOR NUTRITIONS IN SELECTED BERRIES/100G

	Blackberry	Blackcurrant	Blueberry	Boysenberry	Cranberry	Elderberry	Raspberry
Calories (k.cal)	39	48	38	29	41.0	73	50
Protein (g)	1.06	1.26	0.24	1.1	0.35	0.66	1.2
Carbohydrate(g)	14.1	15.6	11.8	10.8	12.3	42	12.6
Dietary fiber (g)	4.7	0.18	1.0	4.2	4.1	7.0	6.5
Total sugar (g)	4.4	5.8	8.1	6.5	3.6	na	4.7
Total fat (g)	0.81	0.37	0.32	0	0.12	0.33	0.65
Cholesterol (mg)	0	0	0	0	0	0	0
Vitamin A (IU)	200	281	62	-	54	600	30
Vitamin C (mg)	19	163	8.5	3.1	12	120	26
Calcium (mg)	28.7	49.5	6.2	18	7.2	38	25
Iron (mg)	0.56	1.35	0.28	0.62	0.22	1.6	0.69
Sodium (mg)	0.6	1.8	0.7	3.4	1.8	26	1
Potassium (mg)	145.6	28.8	76	139	76.5	280	152
Magnesium (mg)	18.1	1.8	6.1	16	5.4	5.0	22

Sources: Pacific Coast Food Products Ltd, USDA National Nutritional Database, Oregon Raspberry & Blackberry Commission,

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Mineral Content in a Serving (95ml) and the Percent of Daily Recommended Value*			
Mineral	Amount/95ml	Current US DRI*	% DRI (US)
Magnesium	400 mg	400 mg	100
Zinc	15.0 mg	15 mg	100
Selenium	70 mcg	70 mcg	100
Manganese	2.0mg	2.0 mg	100
Chromium	120 mcg	120 mcg	100
Molybdenum	75 mcg	75 mcg	100
Copper	2 mg	2 mg	100
Iodine	150mcg	150mcg	100
<i>*Based on 2000 k.cal intake /day</i>			

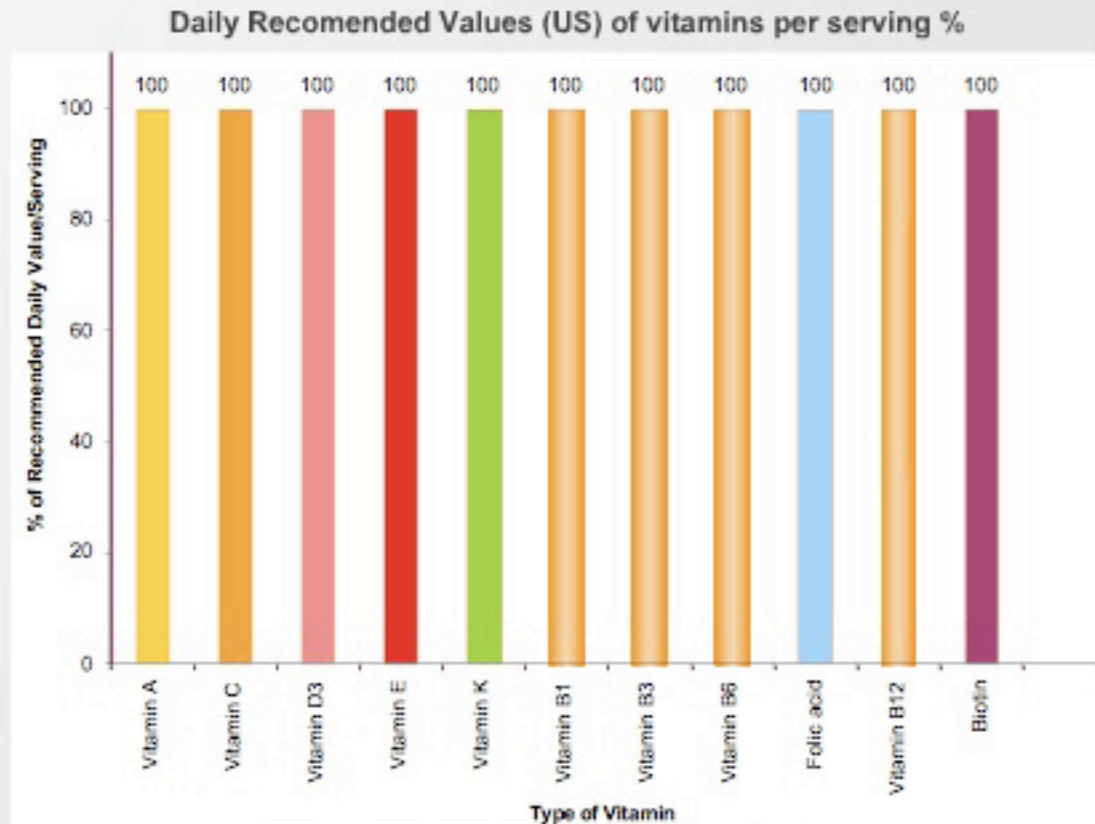
CONTENT OF SPECIALTY PHYTONUTRIENTS WITH HEALTH BENEFITS		
Phytonutrients	Per 100ml	Per Serving (95ml)
Ellagic acid from natural sources	30mg	20mg
Red Raspberry seed extracts*	8mg	5.2mg
<i>Fucus gardneri</i> (Seaweed) extract	530mg	345mg
<i>Ulva lactuca</i> (Seaweed) extract	530mg	345mg
Fucoidan (Seaweed) extracts	36mg	24mg
<i>*A rich source for Ellagitannins/ellagic acid</i>		

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Vitamin Content in a Serving (95ml) and the Percent of Daily Recommended Value			
Vitamin	Amount/95ml Serving	Current US DRI*	% DRI
Vitamin A	5047IU	5000IU	101
Vitamin B ₁	1.5mg	1.5mg	100
Vitamin B ₃	20.2mg	20mg	101
Vitamin B ₆	2.2mg	2mg	110
Vitamin B ₁₂	6.1mcg	6mcg	102
Vitamin C	71mg	60mg	118
Vitamin D ₃	400IU	400IU	100
Vitamin E	30IU	30IU	100
Vitamin K	84.0mcg	80mcg	105
Folic acid	407mcg	400mcg	102
Biotin	300.0mcg	300mcg	100
<i>*Based on 2000 k.cal diet</i>			

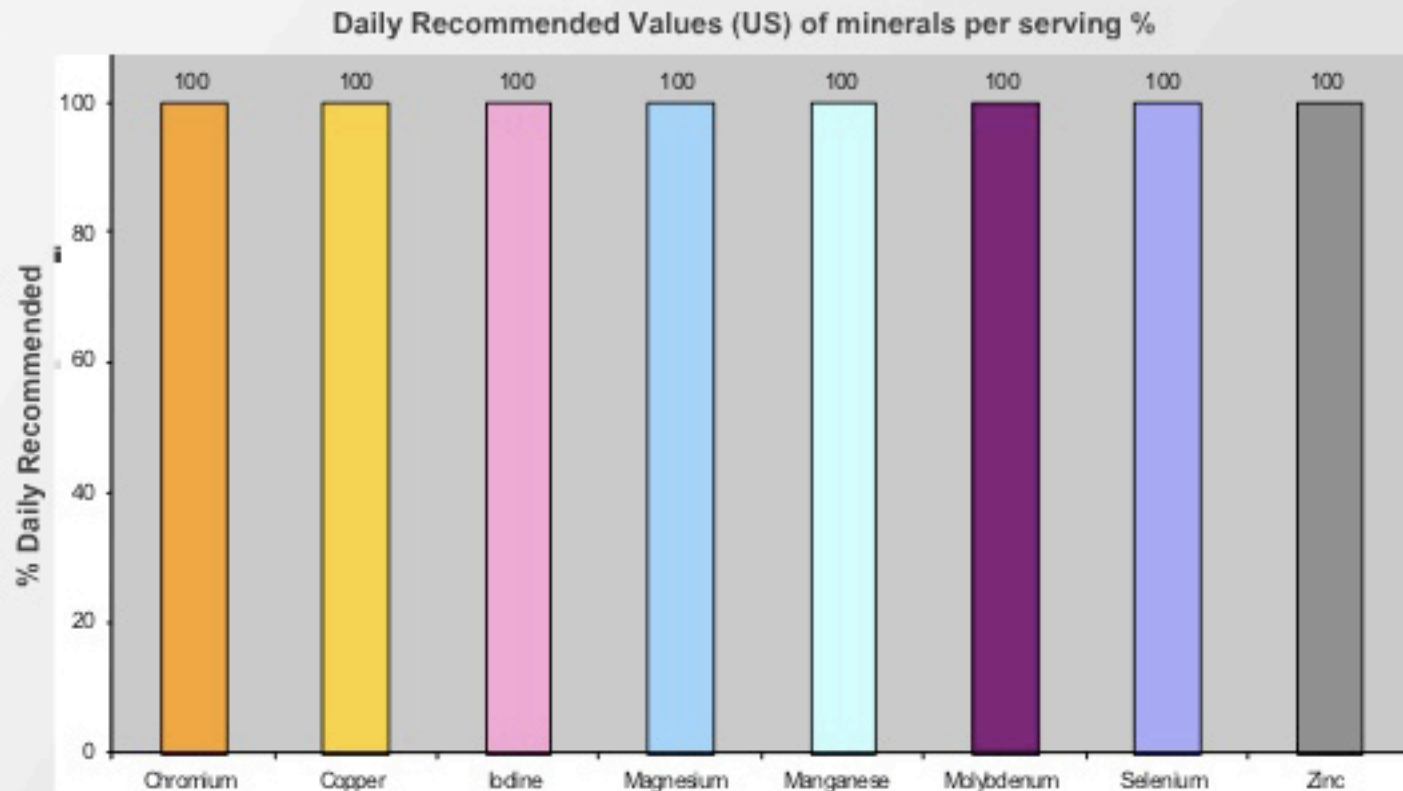
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AMOUNTS OF VITAMINS PER SERVING AS A FRACTION OF RECOMMENDED DAILY VALUES



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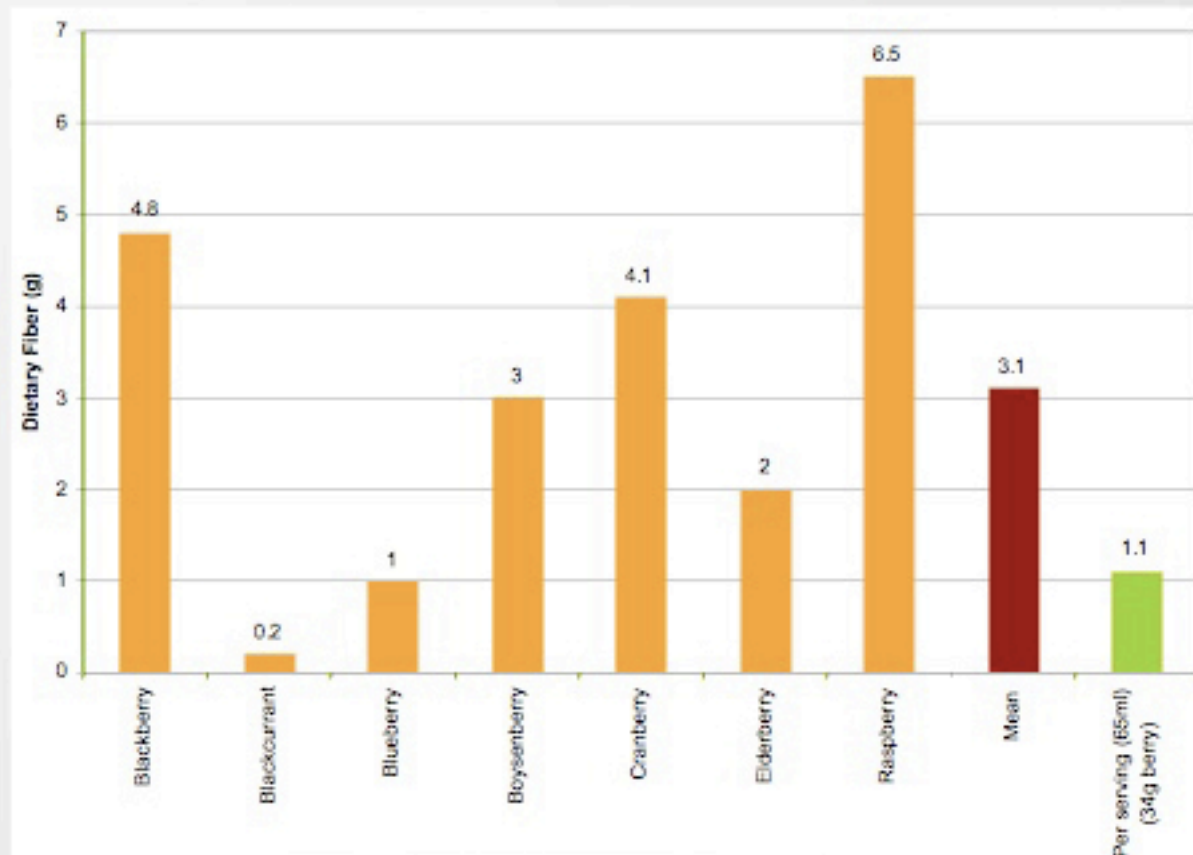
AMOUNTS OF MINERALS PER SERVING AS A FRACTION
OF RECOMMENDED DAILY DOSE



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DIETARY FIBER CONTENT OF COMPONENT BERRY PUREE, FINAL PRODUCT AND PER SERVING OF 95ML YOUTH JUICE

Daily Recommended Values (US) of minerals per serving %



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**YOUTH JUICE IS A POWERFUL ANTIOXIDANT BLEND ENRICHED WITH
SYNERGISTIC BLENDS OF PHENOLICS AND BIOFLAVONOIDS**

	ORAC μ mole Trolox Equiv. /g	Total Phenolics mg/100g	Total anthocyanin mg/100g F.w	Ellagic acid mg/ g dry wt
Raspberry	24	451	20-65	3.39
Blueberry**	44.5	630	170	<1
Blackberry	28	383	83-326	3.69
Boysenberry	42	435	120-160	5.98
Blackcurrant		347	125-200*	
Cranberry**	37.4	1720	3.6	<1
Elderberry ***		40500	330	

*Oregon Raspberry & Blackberry Commission, * Flavour Frag. J. 2004:19:281-286*

*** J. Agric. Food Chem. 49 (3) 2001 *** Elderberry concentrate,*

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BIOLOGICALLY ACTIVE COMPONENTS OF YOUTH JUICE		
Essential Micronutrients		
1	Vitamins	13 different vitamins
2	Amino acids	9 different essential amino acids
3	Fiber	Water soluble and water insoluble fibers
4	Polyphenols • Flavonoids (Bioflavonoids) • Phenolic acids	Anthocyanidins (six different major types) Flavan-3-ols(catechin, gallocatchin) Flavonols (Quercetin, Rutin) Tannins (Ellagitanins, galloctotannins) Hydroxycinnamates, (Chlorogenic acid, Caffeoyle) Hydroxybenzoate
5	Terpenes • Carotenoides	Beta carotene
6	Specialty polysaccharides	Polyanions (ie Fucoidan from brown marine algae)

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POLYPHENOLS (FLAVONOIDS AND PHENOLIC ACIDS)

- Flavonoids are plant phytochemicals that cannot be synthesized by humans
- Phytochemicals in the flavonoid class are referred to as bioflavonoids due to their multifaceted roles in human health
- Anthocyanidins, flava-3-ols, and flavonols are the three main subclasses of bioflavonoids responsible for health benefits including the protection against cancer and heart diseases, enhance vision and increase capillary resistance
- Flavonoids are recognized as very powerful antioxidants
- Anthocyanins are water-soluble pigments responsible for the red, blue and purple colors of fruits and vegetables and other plant tissues
- Quercetin and rutin protect against cell injury from oxidized LDL by inhibiting lipoprotein oxidation
- Phenolic acids including Ellagitannins and galloctotannins play a very important role in our defense systems ability to fight against cancer
- Among the phytochemical compounds found in berries, ellagic acid is the most effective on fighting against cancer.

FLAVONOIDS PREVENTION AND TREATMENT OF DISEASES

- Chronic inflammatory disease
- Cardiovascular diseases
- Cancer
- Arthritis
- Gastric and duodenal ulcers
- Allergy
- Vascular fragility
- Bacterial infections
- Neurological function

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- Immune system
- Urinary tract health

FLAVONOIDS AS ANTIOXIDANTS

- Prevention and treatment of diseases are indirectly related to the flavonoids' antioxidant properties such as
 - Free radical scavenging ability
 - Suppression of radical generating enzymes such as
 - Cytochrome P450
 - Xanthin oxidase

BIOLOGICALLY ACTIVE COMPOUNDS OF BERRIES AND THEIR MECHANISMS OF ACTION AGAINST CANCER

- The biological activities of berries are particularly attributed to their high content of a diverse range of phytochemicals such as
 - Flavonoids (anthocyanins, flavonols and flavonols)
 - Tannins (proanthocyanidins, ellagitannins and gallotannins)
 - Phenolic acids (hydroxybenzoic and hydroxycinnamic derivatives)
 - Lignans
- Berry bioactives impart an anticancer effect through various complementary and overlapping mechanisms of action including:
 - Induction of metabolizing enzymes
 - Modulation of gene expression and their effect on cell proliferation
 - Apoptosis
 - Sub cellular signaling pathways

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Seeram *et al.*, 2006; Blackberry, Black Raspberry, Cranberry, Red Raspberry, and Strawberry extracts inhibits and stimulate apoptosis of human cancer cells in vitro

J. Agric. Food Chem. 2006, 54, 9329-9339

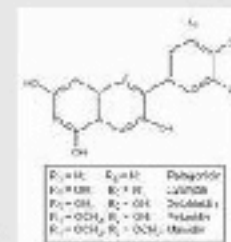
Ellagic acid

- There are many clinical evidences to suggest that red raspberries a rich source of ellagic acid inhibits the growth of cancer cells.
- According to Dr. Daniel Nixon (Hollings Cancer Center, Medical University of South Carolina), a daily consumption of 150g of fresh raspberries (ca. 40mg of ellagitannins) slows the growth of abnormal colon cells in humans, prevents the development of cells infected with human papilloma virus (HPV) the cause of cervical cancer, and most recently found to break down human leukemia cells
- According to Richard Beliveau (Prevention and treatment of Cancer, U of Quebec) and Denis Gingras (UQAM-Sainte-Justine Hospital) diet containing strawberry or raspberry (5% of total diet) led to a significant decrease in the number of esophageal tumors triggered by NMBA, a powerful carcinogen
- They indicated further that ellagic acid prevents the activation of carcinogenic substances into cellular toxins
- Dr. Nixon also revealed that in both the laboratory and clinical study conditions, red raspberry ellagitannins caused cancer cells to go through a nontoxic, normal apoptosis process without damaging the healthy cells.
- Ellagitannins are also effective as a cardiovascular protector. The active components of raspberry extracts responsible for vasorelaxation activity (Barch and Fox, 1988)
- Ellagitannins with a molecular weight in excess of 1000Da would appear to be too large to be absorbed into the circulatory system (cited by Beattie *et al.*, 2005). This indicates the importance of acid hydrolysis or enzyme breakdown of ellagitannins to generate ellagic acid which can be readily absorbed into the blood stream. (see details given below)
- Ellagic acid helps reduction of LDL cholesterol

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Anthocyanidins

- A class of polyphenols responsible for most of vivid colors; red, pink, purple, orange and blue are found in fruits and vegetables
- The anthocyanidin content in berries, immensely contribute to the strong antioxidant potential of berries
- Anthocyanidins also have an ability in cessation of DNA synthesis in isolated cancer cells leading to cell death by apoptosis
- According to a recent study, anthocyanins, flavonols, ellagitannins, and proanthocyanidin rich Blackberry, Raspberry, Blueberry, Cranberry and Strawberry extracts inhibit growth and stimulate apoptosis of human cancer cells including oral, breast, colon, and prostate cancer cells in vitro (Seerama et al., 2006)

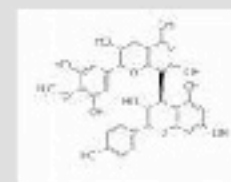


Beliveau and Gingras (2006) in *Foods That Fight Cancer*, pp 133-150

Seeram et al., 2006; Blackberry, Black Raspberry, Cranberry, Red Raspberry, and Strawberry extracts inhibits and stimulate apoptosis of human cancer cells in vitro *J. Agric. Food Chem.* 2006, 54, 9329-9339

Proanthocyanidins (Condensed tannins)

- Proanthocyanidins are complex polyphenols known for their exceptional antioxidant power
- Among the fruits cranberries and blueberries constitute the richest food sources of those bioactive molecules
- Proanthocyanidin-rich cranberry extracts were reported to inhibit the induction of ornithine decarboxylase (ODC), an enzyme involved in tumor cell proliferation, in epithelial cells (Kandil et al., (2002) and proliferation of breast cancer cells (Guthrie, 2000)



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Barch and Fox (1988), *Cancer Research* 1988;48 (24):7088-7092

Beattie et al., (2005), *Current Nutrition & Food Science*, 2005 (1) 71-86

Kandil et al (2002); *J. Agric. Food Chem.*2002,36,1023-1031

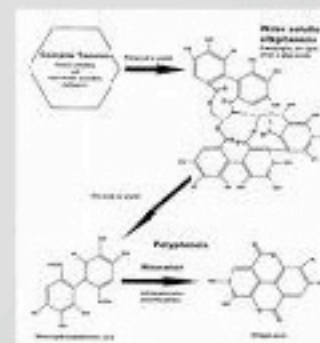
Guthrie, N; Effect of cranberry juice and products on human breast cancer cell growth. *Proceedings of the Experimental Biology Conference*, April 14-18 2000, San Diego, CA

ELLAGIC/ELLAGITANNIN SOURCES IN THE YOUTH JUICE NUTRITIONAL BLEND	
SOURCE	Ellagitannins
Raspberry puree	0.58 mg/100g
Blackberry	8.8 mg/100g
Cranberries	1.2 mg/100g
Blueberry	<1 mg/100g
Boysenberry	198 mg/100g
Raspberry seed extracts	2000mg/100g
Ellagic acid (purified)	70,000mg/100g

COMPLEX TANNINS, ELLAGITANNINS AND ELLAGIC ACID

Acid hydrolysis of complex ellagitannins found in berry extracts to form ellagic acid in the presence of plant polyphenols

According to Beattie et al., (2005), fresh red raspberry contains ca. 100mcg/100g of ellagic acid compared to ca. 30mg/100g ellagitannins



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Why isolated ellagitannins are not as effective as ellagitannins combined in berry juice matrix?

Ellagitannins have a molecular weight in excess of 1000Da would appear to be too large to be absorbed into the circulatory system (cited by Beattie et al., 2005). This indicates the importance of acid hydrolysis or enzyme breakdown of ellagitannins to generate ellagic acid which can be readily absorbed into the blood stream (diagram above)

As indicated by Beattie et al., (2005), ellagitannins breakdown into small molecules; ellagic acid which can be readily absorbed into blood stream in the presence of plant polyphenols. The reaction is more efficient in an acidic environment (pH 4-6) and at 80F. When consuming isolated ellagitannins (or extracts) alone the bioavailability of ellagic acid will be very low due to low conversion rate of ellagitannins into ellagic acid. On the other hand when ellagitannins rich extracts are combined with berry juice which is rich with phenolic compounds and plant enzymes, low pH level, the conversion rate of ellagitannins into ellagic acid will be increased. This will result in increased bioavailability of ellagic acid and hence more health benefits. In addition when ellagic acids are combined with other phytochemicals found in berries, there are some possibilities to have synergistic effects of those nutraceutical ingredients.

Furthermore, the findings on the anticancer effect of ellagic acid were based on the consumption of ellagic acid present in the whole berry matrix. So it is more appropriate to provide ellagic acid in the same way to ensure the health benefits of ellagic acid against cancer.

Youth Juice®

Improved bioavailability of ellagic acid

When developing the Youth Juice® formula and processing methodologies special considerations were given for achieving success in higher recovery/bioavailability of ellagic acid in the final product. In order to protect the activities of those phytochemicals and to preserve the freshness of the products, headspace was flux with a drop of liquid nitrogen

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was flux with a drop of liquid nitrogen

Betattie et al., (2005), *Potential health benefits of berries*, *Current Nutrition & Food Science*, 2005 (1):71-86

Major Phenolic Compounds with Health Benefits Present in the Product

- According to recent findings the major phenolic compounds present in berries are
 - Anthocyanins
 - Flavonols
 - Flavanols
 - Ellagitannins
 - Gallactotannins
 - Proanthocyanins and
 - Phenolic acids
- The major anthocyanins found in berries are varied depending on berry type
- The tannin compositions are also varied depending on the berry type
- As such it is important to have a proper idea about the composition of above phytochemicals in various berries to formulate well balanced, nutraceutical beverages with synergistic effect of active components
- Recent research findings also revealed that Blackberry, Raspberry, Blueberry, Cranberry and Strawberry extracts were highly effective on inhibition of human oral, breast, colon and prostate tumor cell lines
- The above berry extracts were also found to be effective in stimulating the apoptosis of the COX-2 expressing colon cancer cells
- Elderberry, blueberry and cranberry are rich in flavonoids and their extracts showed higher antioxidant activities (Hilbrecht et al., 2006)
- Anticancer properties (anti-initiative and antipromotion) of elderberry have been well documented (Thole et al., 2006)

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Seeram et al., 2006; Blackberry, Black Raspberry, Cranberry, Red Raspberry, and Strawberry extracts inhibits and stimulate apoptosis of human cancer cells in vitro *J. Agric. Food Chem.* 2006, 54, 9329-9339

Hilbrecht Lisa, Ranatunga, J, Oomah Dave, Godfrey, D.V. and Li Tom (2006); *Physiochemical and nutraceutical characteristics of British Columbia wild berry and small fruits*, Project report submitted to the Investment Agriculture Foundation, Ministry of Agriculture and Agri-Food Canada

Thole, J.M. et al., (2006), A comparative evaluation of anticancer properties of European and American Elderberry fruits; *Journal of Medicinal Foods*: 9 (4) 2006, 498-504

Phytochemical Composition of Youth Juice

Fruit and vegetable consumption is inversely related to the incidence of heart diseases and several cancers and are important dietary sources of fibre and essential vitamins and minerals. In addition they contain a vast array of phytochemicals which may have potential health benefits. As cited by Beattie et al., (2005) the benefits include effects on oxidative damage, detoxification enzymes, the immune system, blood pressure, platelet aggregation, anti-inflammatory, anti-bacterial and anti-viral responses. Among the most important beneficial phytochemical groups found in berries including polyphenol compounds are flavonoids commonly known as bioflavonoids (anthocyanidins, flavan-3-ols, flavonols) and phenolic acids and their esters (tannins, hydroxycinnamates). The contents of above phytochemicals are varied depending on the type of berries, time of harvest and method of processing. Youth Juice® formulation was based on the results of laboratory investigations performed to determine the content of above phytochemicals in a range of berry types. As a result of careful analysis of research findings, seven different berries were selected and synergistically blended to provide the well balanced nutritional properties and the highest antioxidant capacity (Oxygen Radical Absorbance Capacity-ORAC value) to Youth Juice®. The results of the biochemical analysis of component berry purees and the final product (Youth Juice®) are presented in the following table. As shown in the table Youth Juice is rich with various

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beneficial phenolic compounds, such as tartaric esters, flavonols, and anthocyanins which are derived from seven different sources of berries.

Table: Phytochemical composition of various berry purees used to formulate Youth Juice (mg/mL)

Component berry	Total phenolics	Tartaric esters	Flavonols	Anthocyanins	Flavonoids
Blackberry puree	35.1	1.7	1.9	4.2	2.8
Blackcurrent puree	71.2	2.9	3.4	17.4	8.3
Blueberry puree	36.8	2.3	2.4	4.5	3.2
Boysenberry puree	67.8	2.1	2.3	10.5	5.6
Cranberry puree	20.2	1.1	1.5	1.5	1.7
Elderberry conc.	405.5	21.4	30.1	86.9	62.6
Raspberry puree	48.5	1.8	1.8	3.3	2.7
Youth Juice ®	56.25	2.09	2.65	6	3.57
Total phenolics expressed as mg catechin equivalents/ml puree					
Tartaric esters expressed as Caffeic acid, mg equivalents/ml puree					
Flavonol expressed as mg Quercetin equivalents/ml puree					
Anthocyanins expressed as mg cyanidin-3-glucoside equivalents/ml puree					
Flavonoid expressed as mg rutin equivalents/ml puree					

Anthocyanins and polyphenolic compounds of Youth Juice® and Alzheimer's

According to our research findings, Youth Juice® contains higher amounts of polyphenols (56 mg/mL) and anthocyanins (6mg/ml) derived from seven different berries including boysenberry and blackcurrants (Hilbrecht et al 2007). According to the research study conducted by Dilip Ghosh et al, (2006) at the Horticulture and Food Research Institute in New Zealand, anthocyanins and other phenolic compounds

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present in boysenberry and blackcurrants were effective against the inhibiting of oxidative stress caused by dopamine and amyloid- β , peptides associated with Alzheimer's and damage to cellular DNA in SH-SY5Y and HL-60 human neuroblastoma cells. These research findings showed the ability of anthocyanins and polyphenols found in boysenberry and blackcurrant to block the brain cell damages which leads to Alzheimer's. According to the report published in Medical Research News, on 23rd Jan. 2006, compounds in blackcurrants could prevent Alzheimer's disease. According to James Joseph a researcher at the Tufts University "these compounds also work in hippocampal cells taken straight from the brain and the effect will likely be reproduced in the human body and that blackcurrants could help prevent or significantly delay the onset of Alzheimer's".

Dilip Ghosh, McGhie, T.K., Zhang, J., Adaim, A., Skinner M (2006), Effects of anthocyanins and other phenolics of boysenberry and blackcurrant as inhibitors of oxidative stress and damage to cellular DNA in SH-SY5Y and HL-60 cells; *J. of the Science of Food and Agriculture*: Vol 86 issue 5, pp 678-686

Hilbrecht Lisa, Ranatunga, J, Oomah Dave, Godfrey, D.V. and Li Tom (2006); *Physiochemical and nutraceutical characteristics of British Columbia wild berry and small fruits*, Project report submitted to the Investment Agriculture Foundation, Ministry of Agriculture and Agri-Food Canada

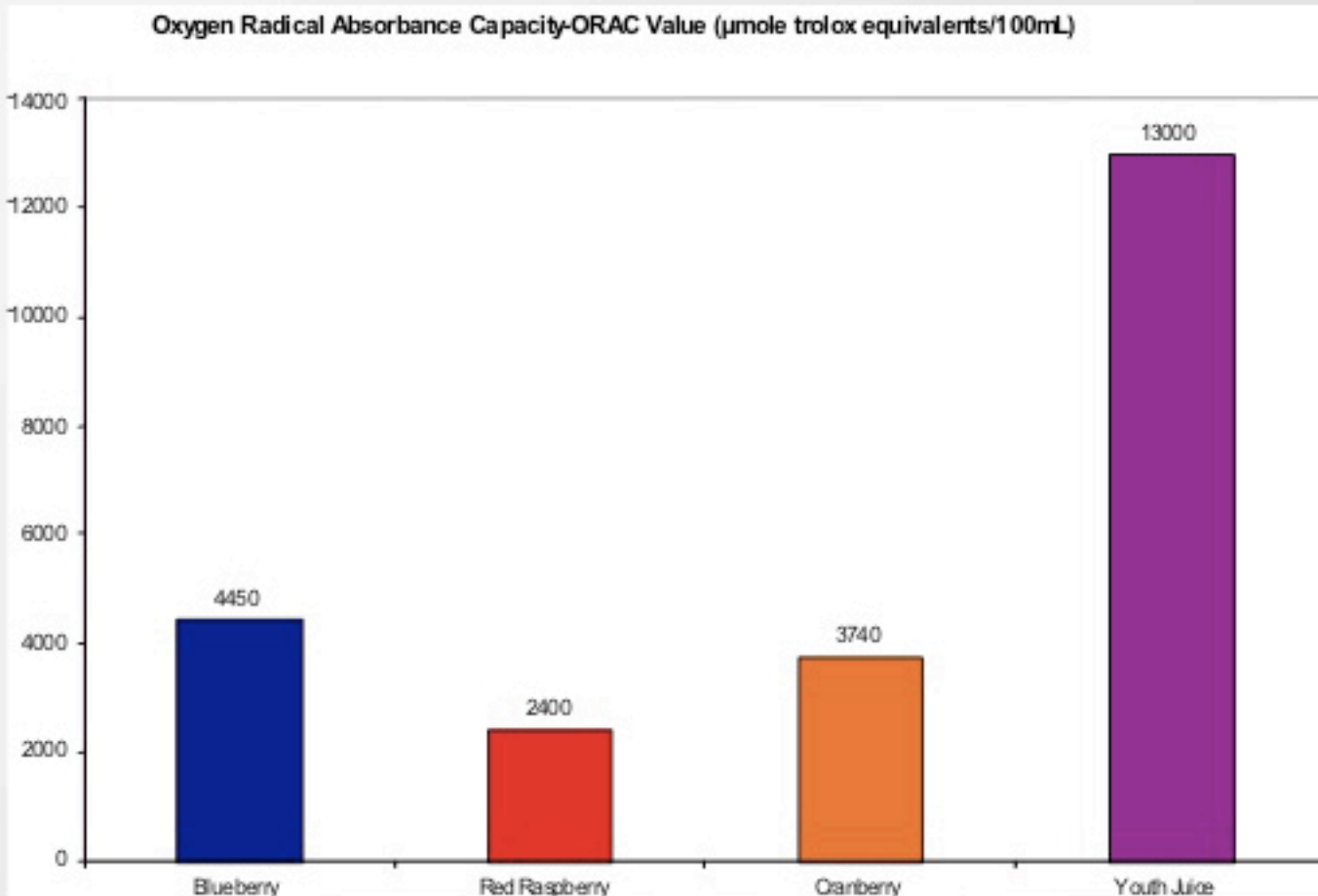
Medical Research News, Jan 23, 2006, Compounds in blackcurrants could prevent Alzheimer's disease (www.news-medical.net)

Antioxidant Capacity of Youth Juice

Youth Juice® a blend of seven carefully selected berry purees, was further enriched with vitamin and minerals and specialty phytochemicals, such as ellagic acid, fucoidan and seaweed extracts those possessing health benefits and antioxidant activities. As a result of the synergistic combination of all the above ingredients, Youth Juice® provides a very high level of antioxidant capacity. The antioxidant activity of the product was measured using Oxygen Radical Absorbance Assay and results were expressed as

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Oxygen Radical Absorbance Capacity (ORAC Value) and compared with ORAC values of popular three berry juices. As shown in the figure ORAC value of Youth Juice (13,000 μ mole trolox equivalent/100ml) is about x3 times higher than that of Blue berries (4450 μ mole trolox equivalent/100ml) and about x6 times higher than Red Raspberries (3740 μ mole trolox equivalent/100ml).



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What is ORAC?

ORAC stands for Oxygen Radical Absorbance Capacity and it is a measurement of antioxidant capacity of foods, beverages and nutraceuticals.

What is antioxidant?

Cells in humans and other organisms are constantly exposed to a variety of oxidizing agents, some of which are necessary for life. These agents may be present in air, food, and water or they may be produced by metabolic activities within cells. Overproduction of oxidants can cause an imbalance, leading to oxidative stress (Liu, 2003). Oxidative stress can cause oxidative damage to large biomolecules such as proteins, DNA, and lipids, resulting in an increasing risk for cancer and cardiovascular disease. As indicated by Ames and Gold (1991), a sufficient amount of antioxidants such as phenolics, carotinoids, and anthocyanins need to be consumed in order to prevent or slow down the oxidative stress induced by free radicals.

What is the daily requirement of antioxidants?

According to USDA, research team at Tufts University, at least 2400 to 3000 ORAC/day is needed to provide meaningful antioxidant health benefits.

What is the ORAC value of Youth Juice serving of 95ml?

Antioxidant Capacity of Youth Juice is 13,000 ORAC units/100ml. So 95ml serving of Youth Juice provides 12350 ORAC units.

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Why Youth Juice is considered to be a better option as a source of antioxidant?

According to the clinical research findings, the consumers should be getting antioxidants from a diverse diet and not from expensive nutritional supplements, which do not contain the balanced combination of phytochemicals found in fruit and vegetables (Liu, 2003). The findings further revealed that obtaining antioxidants from foods originating from plants contain many diverse types of phytochemicals in varying quantities. In addition, the health benefits of the consumption of fruits and vegetables extend beyond lowering the risk of developing cancers and cardiovascular diseases. Youth Juice® is a synergistic blend of an array of phytochemicals derived from a range of whole fruits, seaweed extracts and vitamin and minerals formulated to deliver a balanced amount of phytonutrients with various health benefits and a higher amount of antioxidants to combat free radicals

Reference

- 1.Beattie J, Crozier, A and Duthie, G. (2005); Potential health benefits of berries; *Current Nutrition and Food Science*, 2005 (1):75-86
- 2.Ames B.N., Gold, L.S (1991), Endogenous mutagens and the cause of aging and cancer, *Mutat. Res.* 1991: (250): 3-16
- 3.Liu R.H.(2003), Health benefits of fruits and vegetables are from additive and synergistic combination of phytochemicals, *Am. J. Clin. Nutr* 2003;78 (suppl):517S-20S
- 4.Hilbrecht Lisa, Ranatunga, J, Oomah Dave, Godfrey, D.V. and Li Tom (2006); *Physiochemical and nutraceutical characteristics of British Columbia wild berry and small fruits*, Project report submitted to the Investment Agriculture Foundation, Ministry of Agriculture and Agri-Food Canada