THE ARCTIC

LINGONBERRY – taste from the northern nature

北欧越橘——来自北方大自然的风味

Arctic lingonberries grow wild in Finland's forests

Lingonberries grow wild in the undergrowth of Finland's forests. Every year, between 200 and 500 million kilos (average approximately 260 million kilos) of lingonberries grow in Finland, depending on the growing season. Although the lingonberry harvest is the highest of any berry in Finland, only approximately 10% of the amount available is picked.

Finland's everyman's rights allow people to pick wild forest berries on forest land owned by others without the landowner's permission.

Finnish companies use lingonberries to make jam and juice, and manufacture powdered, coarsely ground and dried berries, used as ingredients in smoothies, muesli, bars and chocolates. Lingonberries are also used in wines and liqueurs. The effective substances isolated from lingonberries are also used as ingredients in cosmetics and in nutritional supplements.

芬兰森林中野生的北欧越橘

野生北欧越橘生长在芬兰森林的下层林丛中。每年根据生长季节的不同，在芬兰能长出2至5亿公斤的越橘（平均约2.6亿公斤）。虽然芬兰的越橘收成在所有浆果中是最高的，但最终仅采摘总量的约10%。

芬兰的“人人有权”政策允许人们在没有土地所有者许可的情况下，在其他人拥有的林地上采摘野生森林浆果。

芬兰公司使用越橘制作果酱和果汁，并将其研磨成粉、粗磨及干制，用作冰沙、牛奶、零食棒和巧克力中的原料。越橘也用于葡萄酒和烈酒中。从越橘中提取的有效物质也可用作化妆品和营养补充剂中的成分。

Lingonberries are part of Finnish food culture

The history of using lingonberries in Finland dates back centuries. Lingonberries contain large amounts of citric and benzoic acid, which are natural preservatives. Lingonberries were also an important addition to the Finnish diet long before the development of modern preserving methods and equipment.

Even today, more than half of the Finnish population regularly pick lingonberries for their own use. The natural preservatives that lingonberries contain could be isolated for use in food products, nutritional supplements and cosmetics and in the packaging industry.

Traditionally, lingonberries have been used as purées and jams to accompany meat dishes. Traditional Finnish cuisine uses lingonberries in porridge and pies, including rye porridge with lingonberries, whipped berry porridge with semolina and Kainuun rönttönen, a pie from Kainuu made from rye pastry filled with mashed potato and lingonberries that has Protected Designation of Origin status in the EU.

In the past, lingonberries were also used as a folk remedy in the Nordic countries and by the indigenous peoples of North America. Traditional use in folk medicine is now also being studied using the methods of modern medicine.

越橘是芬兰美食文化的一部分

在芬兰，使用越橘的历史可以追溯到几个世纪前。越橘含有大量柠檬酸和苯甲酸，这两者是天然的防腐剂。在研发出现代保鲜方法和设备之前，越橘也是芬兰饮食的重要补充。

时至今日，超过半数的芬兰人依然经常性地采摘越橘以供自用。越橘含有的天然防腐剂可被提取出来，用于食品、营养补充剂、化妆品以及包装行业中。

越橘历来被制成果泥或果酱，以搭配肉类菜肴。传统的芬兰菜肴在粥和馅饼中加入越橘，包括越橘黑麦粥、用粗粒面粉煮成的浆果甜粥，以及Kainuun rönttönen——一种来自凯努地区的黑麦饼，其内馅为土豆泥和越橘，已获得欧盟原产地名称保护。

在过去，越橘也被北欧国家和北美土著用作偏方。如今，人们正使用现代医学方法，研究越橘在民间医学中的传统使用。

Arctic lingonberries are handpicked in the cleanest forests in Europe

About 97% of Finland's forests are unfertilised and suitable for organic picking. Finland has a low population density and is situated far from Europe's major sources of pollution. This makes Finnish forests some of the cleanest in Europe. Lingonberries, like other wild berries, are picked using hand-held berry-picking rakes, without machines, in a clean growing environment a safe distance away from roads and outside populated areas.

The northern latitude increases the content of effective substances

The secondary compounds contained in the plants protect the plants from the tough environmental conditions, such as aridity, fungal diseases and the UV rays of the sun. In northern areas where the sun shines long into the night and even 24 hours a day, plants produce more polyphenols to protect them from sunlight than in more southerly areas. Lingonberries contain several polyphenols such as lignans, proanthocyanidins, quercetin and resveratrol.

北欧越橘生长自欧洲最纯净的森林，经手工采摘

芬兰约97%的森林未施肥料，适合有机采摘。 芬兰人口密度低，远离欧洲的主要污染源，因此拥有一部分全欧洲最纯净的森林。如同其他野生浆果一样，越橘的采摘不使用机器，采用手持的浆果采摘耙，选自纯净的生长环境，远离人口稠密地区，与道路保持安全的距离。

高纬度提高了有效物质的含量

植物中所含的次级化合物保护植物免遭干旱、真菌病和太阳紫外线等恶劣环境条件的影响。北部地区的日照时间持续至深夜，甚至高达全天24小时，与南部地区相比植物可产生更多的多酚，以保护其免受阳光照射的伤害。越橘含有多种多酚，如木脂素、原花色素、槲皮素和白藜芦醇。

Lingonberries are well suited to preventing diseases of affluence

The nutrition claims permitted for lingonberries – low energy, fat free, high fibre – do not tell the whole story of how healthy lingonberries are. Although the vitamin content of lingonberries does not reach the heights of many other berries, their high polyphenol content is their trump card.

The polyphenols contained in lingonberries may help to prevent inflammation, cardiovascular diseases, diabetes and urinary tract infections (UTIs). The use of lingonberries is also being studied regarding some cancers and lowering the risk of high blood pressure. Lingonberries may also have an effect in balancing oestrogen levels. In animal tests, lingonberries have also helped with weight management. However, additional research is required before such health claims can be made for lingonberries.

越橘有助于预防富贵病

允许的越橘营养声称——低能量、无脂肪、高纤维——不足以全面地说明越橘的健康益处。虽然越橘的维生素含量不及许多其他浆果，但高多酚含量乃是其王牌。

越橘中所含的多酚可能有助于预防炎症、心血管疾病、糖尿病和泌尿道感染（UTI）。此外，还有一些研究涉及越橘降低癌症和高血压风险的作用。越橘也可能具有平衡雌激素水平的功效。在动物试验中，越橘还有利于体重管理。然而，需要进一步的研究才能做出有关越橘的此类健康声称。

Lingonberries and cranberries: different berry, same effect

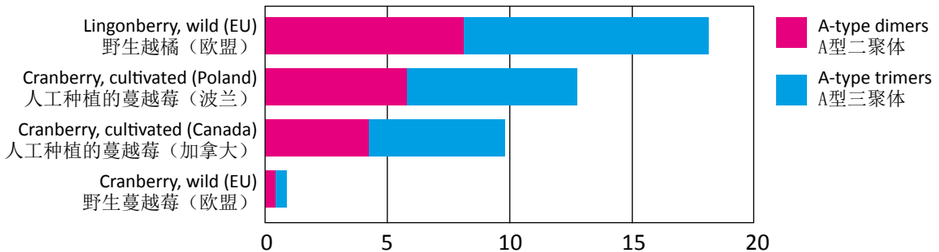
With their red berries, lingonberries are often confused with cranberries, two species of which are found: *V. macrocarpon*, grown widely in Canada, and *V. oxycoccos*, common in Europe. A number of studies have been published on the effect of cranberries and cranberry products in preventing UTIs. A-type and B-type proanthocyanidin have attracted particular attention. Of the two, A-type proanthocyanidin has been linked with antiadhesion activity against the E. coli bacteria that causes UTIs and a thus lowered susceptibility to infection. However, the European Food Safety Authority has not so far granted the right to make health claims for lingonberries or cranberries on the basis of these research results.

越橘和蔓越莓：不同的浆果，相同的效果

越橘因其红色的浆果常常与蔓越莓混为一谈，业已发现的蔓越莓有两种：在加拿大遍地生长的美洲蔓越橘和欧洲常见的北方蔓越橘。 一些已发表的研究探讨了蔓越莓和蔓越莓产品在预防UTI方面的作用。 A型和B型原花青素尤其备受关注。其中A型原花色素对于导致UTI的大肠杆菌具有抗粘连的作用，从而降低了易感性。然而，欧洲食品安全局迄今尚未授予在这些研究结果的基础上提出越橘或蔓越莓健康声明的权利。

Concentrations of A-type proanthocyanidin dimers and trimers (mg A2 equiv / 100 g) in fresh berry samples

新鲜浆果样本中A型原花色素二聚体和三聚体的含量（毫克当量/ 100克）



Lingonberries contain high concentrations of A-type proanthocyanidin and its different isomers (dimers and trimers) compared both with Canadian and European cranberries. Diagram modified from Jungfer et al. 2012.

与加拿大和欧洲蔓越莓相比，越橘含有高浓度的A型原花色素及其各种异构体。图表据Jungfer et al. 2012，有修改。

Arctic lingonberries contain high amounts of quercetin and resveratrol

Berries and vegetables that contain high concentrations of polyphenols are often associated with health benefits. Polyphenols, such as quercetin and resveratrol, which are flavoids, are said to lower susceptibility to degenerative diseases of the nervous system and cardiovascular diseases, and to reduce the risk of cancer and the formation of metastases. Both quercetin and resveratrol act as antioxidants, whose combined effect on preventing diseases may be greater than their individual impact. This means that to maximise health benefits, diet should include several simultaneous and mutually supporting antioxidant microcomponents.

A) Quercetin

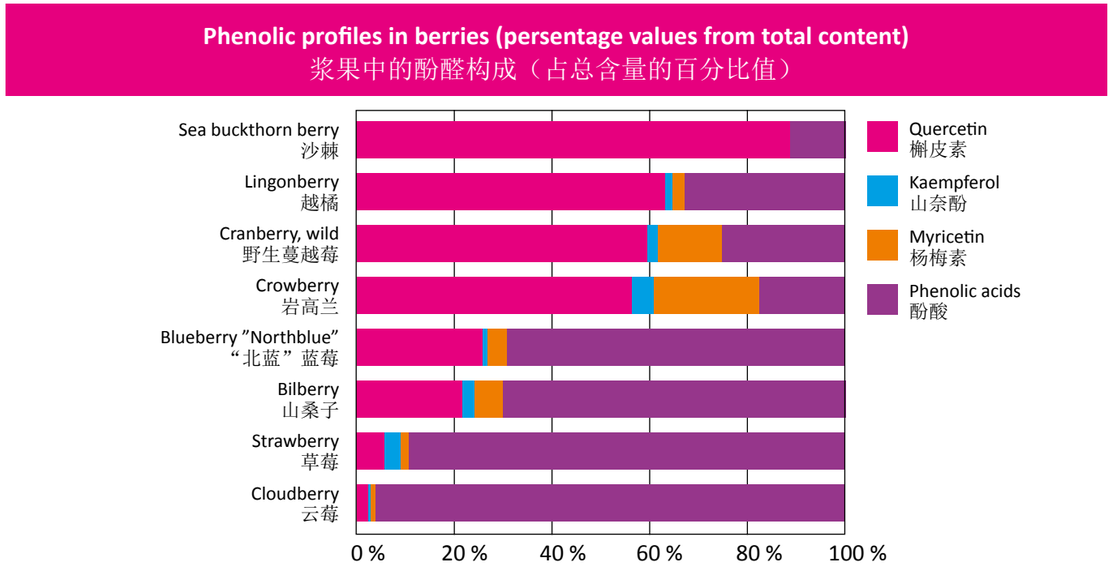
Quercetin is one of the polyphenols that has attracted the most attention. The antioxidant effects of quercetin have been studied regarding its effect in preventing inflammation and lowering blood pressure. Additionally, quercetin has been studied in terms of preventing the formation of atherosclerotic plaque and as a platelet aggregation inhibitor.

北欧越橘富含槲皮素和白藜芦醇

富含多酚的浆果和蔬菜通常有益于健康。槲皮素和白藜芦醇（黄酮类化合物）等多酚据称可降低神经系统退行性疾病和心血管疾病的易感性，并减少癌症和肿瘤转移的风险。槲皮素和白藜芦醇均为抗氧化剂，其预防疾病的综合作用可能高于其各自单独的影响。这意味着，为了最大限度地提高健康益处，饮食应包含多种可同时作用并相互支持的抗氧化微量成份。

A） 槲皮素

槲皮素是最受关注的多酚之一。槲皮素在预防炎症和降低血压方面的抗氧化作用已经过了研究。另外，还有一些研究涉及槲皮素防止动脉粥样硬化斑块的形成和作为血小板聚集抑制剂的功效。



Lingonberry is one of the most important berries containing quercetin. Diagram adapted from Häkkinen et al. 1999.

越橘是含有槲皮素的最重要浆果之一。图表据Häkkinen et al. 1999，有改编。

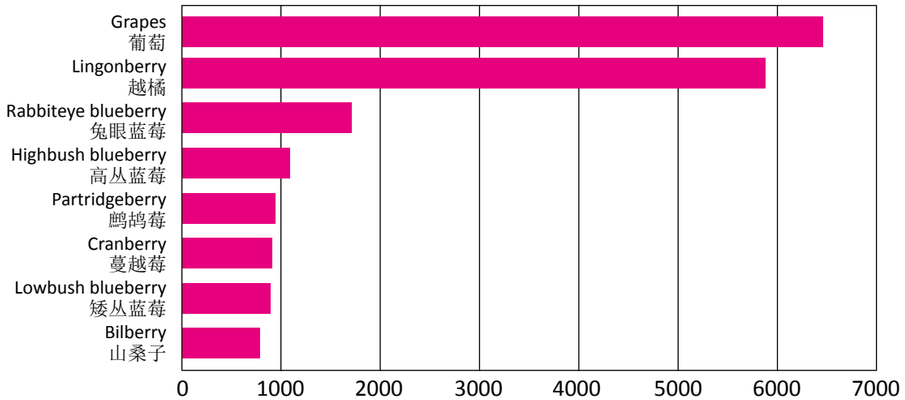
B) Resveratrol

Resveratrol is said to protect cells from ageing and is often associated with prevention of metabolic disorders as a result of ageing. Resveratrol from lingonberries is an important ingredient in cosmetics. The reported health effects of resveratrol are largely the same as those of quercetin. A significant proportion of current research is concentrated on the effects of the resveratrol contained in wine in promoting health.

B) 白藜芦醇

白藜芦醇据称可减缓细胞老化，并预防老化引起的代谢紊乱。越橘中的白藜芦醇是化妆品的重要成分。据报道，白藜芦醇的健康效用与槲皮素大体相同。目前的大部分研究集中于葡萄酒中所含白藜芦醇对促进健康的影响。

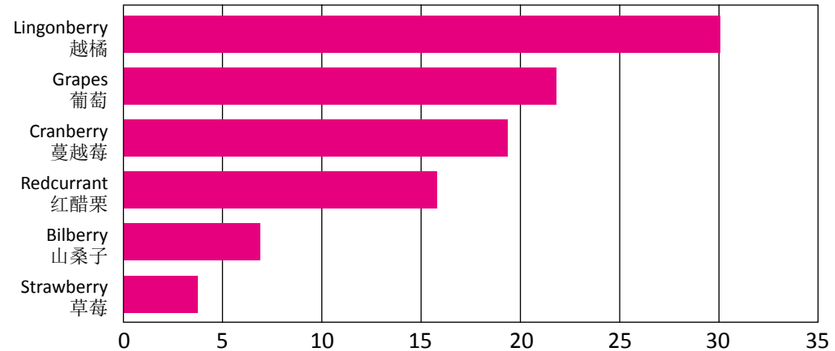
The amount of resveratrols (ng/g dry weight) on Vaccinium berries and grapes
越橘属浆果和葡萄中白藜芦醇的含量（奈克/ 克干重）



Lingonberries contain almost as much resveratrol, the ingredient said to make red wine healthy, as grapes do. Diagram modified from Rimando et al. 2004.

越橘含有与葡萄几乎等量的白藜芦醇，据说正是这种成分令红葡萄酒健康。图表据Rimando et al. 2004，有修改。

Thecontent of trans-resveratrol in berries and grapes (µg/g fresh weight)
浆果和葡萄中反式白藜芦醇的含量（微克/ 克鲜重）



Lingonberries contain more trans-resveratrol compared to black grapes. Diagram from Piñeiro et al. 2006 and Ehala et al. 2005.

与黑葡萄相比，越橘的反式白藜芦醇含量更高。图表据Piñeiro et al. 2006和Ehala et al. 2005。

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