

Cultivation and Breeding of Buckwheat as a New Kind of Functional Food in Korea

Cheol Ho Park¹ and Kwang Jin Chang²

¹Division of Biotechnology, Kangwon National University, Chunchon 200-701, Korea

²Korea National Agriculture College, Hwasung 445-893, Korea

The first record of buckwheat in Korea was revealed from an old Korean book, "Hyangyakguguebbang(藥救急方)" written in the era of king 'Gojong' who governed the country from AD 1236 to 1251 in the Korea dynasty.

Buckwheat in Korea has been known to be introduced from China in 5th - 6th century. One of the most famous buckwheat noodles, 'Naengmyeon' had been used popularly among the people in the Korea dynasty. It is true that buckwheat noodle had been cooked and sold in temples during the Korea dynasty, and was regarded it as one of the temple foods at that time.

Buckwheat has been cultivated as an alternative crop and buckwheat grains have been used as a hardy plant when the food situation for people was lacking in Korea. Buckwheat was an important crop in a slash-and-burn field(shifting cultivation) of the mountainous area in Kangwon province. A written history of the shifting cultivation in Korea was found in an old book "Taekriji" which was written by Lee, Jung-Hwan in the Chosun dynasty.

The area and number of households of shifting cultivation in Korea was 40,000 ha and 135,000 household, respectively in 1973. Fifty to sixty kilogram of buckwheat grains per 1a was harvested at an altitude of 600 - 800m. Folk songs which have been sung among the people in shifting areas include buckwheat meal. One of the folk songs for buckwheat is as follows; "they do not eat rice with or without waxy property but eat buckwheat mixture."

Since 1974, shifting cultivation has been legally prohibited to allow revegetation of destroyed mountains and rehabilitation of woodlands in Korea.

Buckwheat has been traditionally marketed as noodle or flour for the manufacture of noodles, and also as groats for food in Korea. Consumption in markets has increased over the past several years. Buckwheat grains are mainly consumed in the form of noodles in Korea. However, many people have recently pursued a desire to make food products of high quality in processing buckwheat materials for health reasons.

In Korea, today buckwheat is annually cultivated in an area of 3,500 - 5,100ha. In 1982, the area of buckwheat fields was increased to 18,900 ha, but decreased drastically due to much cheaper buckwheat grains imported mostly from China. Recently, buckwheat grain imports were 1,000 - 3,000M/T.

Nowadays, the highest yield of buckwheat has been achieved in southern parts of Korea, because buckwheat flowers are used to produce honey even though Kangwon province has traditionally used buckwheat grains as a main food or foodstuff. In 1999, yearly yield of buckwheat in Korea amounted to 4,505M/T and the average yield was 101kg per 10a. It is estimated that Korean people have consumed a quantity of 6,000 to 9,000M/T per one year. In fact, there are no data known on the amount of buckwheat to be imported for animal feed.

If the amount of buckwheat grains for animal feed is added to the total consumption of buckwheat in Korea, the amount of imported buckwheat grains will be much higher than official data based on only use for food.

The market price of buckwheat grains was different according to the origin: 3 US\$ per kg for buckwheat grains produced in Korea, but 1.5 US\$ per kg for buckwheat grains imported from China. Buckwheat grower's income which was estimated as 128US\$/10a in gross and 100US\$/10a, respectively appears to be very low in Korea. As a result of buckwheat cultivation, the average income rate is about 78% in Korea.

We have 220 landraces collected in all the areas of Korea, and classified them into Bongpyoungjaerae, Youngwoljaerae, and Chunchonjaerae etc. The recommended cultivars in Korea are Suwon 1 (Yangjeolmaemi), 2, 4, 12, 15, and 17 etc., which were developed by selecting superior lines among the foreign cultivars. Most of the cultivars available for developing cultivar were Japanese and Canadian cultivars.

Recently, a few wild species including a self-fertilizing *F. homotropicum* and a perennial *F. cymosum* were introduced for cross breeding by the cooperation of buckwheat scientists in the world.

The growing season of buckwheat in Korea is from the middle of April to the middle of October. Seeds were scattered by hand or sowing machine and fertilizer sprinkler and the sowing rate is 13~15 liter per 10a with planting density of 6~9cm. Fertilizers such as N, P, and K are supplied at the rate of 2~5g/10a, and 1,000kg of compost is sprayed before ploughing. *Erysiphe polygoni* DC. and *Cercospora fagopyri* NAKATA et TAKIMOTO have been known as common diseases in the process of buckwheat cultivation.

There is a long history of cultivating and using buckwheat as a foodstuff in Korea. Noodles(Naengmyeon or Makguksoo), pancakes, sprouts, teas, jellies, vegetables and liquor have buckwheat materials such as groat, leaves, or flower. Also, there are many types of mills, cook instruments, and medicinal preparations.

It is specially noteworthy for us to grow sprouts from buckwheat seeds and to pop the groats which pericarps were removed because they still have a higher rutin content and possibility of commercialization. Flower tea which was made of dried flowers of buckwheat is considered as foodstuff suitable for many people who an intensive health care is needed because it has the highest content of rutin.

It is very unique for us to make a number of noodles with buckwheat flour. Besides noodles, we have other types of buckwheat cook in both South and North Korea. They include buckwheat cake(Maemilchongduk), jelly(Maemilmuk), pancake(Maemiljeonbyoung), Maemilmandu, Maemilsujebi, and Maemilbab.

Buckwheat pericarps have been traditionally used as a container in pillow. Buckwheat hay was fired and smoked to repel ghosts as a part of a funeral custom when a funeral ceremony was carried out long time ago. Ash made from fired buckwheat hay was used to make soap in old days.

There is an annual noodle festival called Makgooksoo Chukje in Chunchon city. People of Pyoungchang county, Kangwon province are proud of a novelist Hyo Seok Lee because he wrote a prominent novel named " when the buckwheat blooms" and became a national novelist.

The festivals includes a large number of events such as writing and drawing contest, contest for choosing person who can fastly eat noodle, presentation of cooking buckwheat, exhibition of buckwheat materials, photography contest regarding buckwheat, and so on.

To stimulate the research and popular culture referring to buckwheat in Korea, we organized the Korea Buckwheat Research Association(KBRA) in 1996. The KBRA held regular seminar in each semester and conducted co-project for buckwheat research. We have published a magazine titled " Maemil(it means buckwheat in Korean)" twice a year. The magazine is an unique crop magazine in Korea and deals with scientific information, research results, marketing information, and technology news, related literatures, essay and poem, and ethnologic materials written by many members and volunteers.

There are not so many buckwheat researchers in Korea. In fact, we don' t have a long

history of buckwheat research compared to the high production and popular utilization of buckwheat in Korea. Since 1980, a few scientists have studied buckwheat in several aspects of cultivation, breeding, food chemistry and food processing, bioactive natural compounds, and extraction of new materials for functional food, and pharmaceutical use.

Especially, the main objectives of improving cultural practices are to save labor time and to increase productivity especially under the poor environment. Breeding has been aimed at the development of new cultivars with larger seeds, higher yield and quality, self-fertilization, and high adaptability to mechanization.

The functional components, lipid metabolism, and antimutagenic activities from buckwheat researches of bioactive properties has been reported by Korean scientists.

Although buckwheat industry in Korea is still a small scaled business, buckwheat industry is expected to show a prominent position gradually. The cooperation between farmers and industry men is very important to supply raw materials of high quality for propelling food processing. Modernization of milling factories includes an automation of apparatuses and development of new materials such as ceramic that is free from wearing.

Nowadays, owners of food processing companies are seeking for new materials and methods adaptable to diversified taste of consumers in manufacturing buckwheat foodstuffs. Fresh or dried buckwheat sprouts are attracting many concerns from pharmacy or food companies. Roasted sprout tea is also in processing to be commercialized. Also, popped buckwheat snack is one of our promising commodities to be developed in the future.