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Food legume production in China

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ABSTRACT

Food legumes comprise all legumes grown for human food in China as either dry grains or vegetables, except for soybean and groundnut. China has a vast territory with complex ecological conditions. Rotation, intercropping, and mixed cropping involving pulses are normal cropping systems in China. Whether indigenous or introduced crops, pulses have played an important role in Chinese cropping systems and made an important contribution to food resources for humans since ancient times. The six major food legume species (pea, faba bean, common bean, mung bean, adzuki bean, and cowpea) are the most well-known pulses in China, as well as those with more local distributions; runner bean, lima bean, chickpea, lentil, grass pea, lupine, rice bean, black gram, hyacinth bean, pigeon pea, velvet bean, winged bean, guar bean, sword bean, and jack bean. China has remained the world's leading producer of peas, faba beans, mung beans, and adzuki beans in recent decades, as documented by FAO statistics and China Agriculture Statistical Reports. The demand for food legumes as a healthy food will markedly increase with the improvement of living standards in China. Since China officially joined the World Trade Organization (WTO) in 2001, imports of pea from Canada and Australia have rapidly increased, resulting in reduced prices for dry pea and other food legumes. With reduced profits for food legume crops, their sowing area and total production has decreased within China. At the same time, the rising consumer demand for vegetable food legumes as a healthy food has led to attractive market prices and sharp production increases in China. Vegetable food legumes have reduced growing duration and enable flexibility in cropping systems. In the future, production of dry food legumes will range from stable to slowly decreasing, while production of vegetable food legumes will continue to increase.

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1. Introduction

Food legumes in China are defined as all legume crops used for human food either as dry grains [1–3] or as vegetables [3,4],

except for soybean and groundnut [4]. China has a vast territory, complex ecosystems, and a great variety of pulse species [4–6]. Food legume crops can be divided into three groups according to their cropping seasons: cool-, temperate-,

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and warm-season food legumes [4,5]. Cool-season food legumes, composed of broad bean (*Vicia faba* L.), pea (*Pisum sativum* L.), chickpea (*Cicer arietinum* L.), lentil (*Lens culinaris* Medik), grass pea (*Lathyrus sativus* L.) and lupine (*Lupinus* L.), are sown in fall in south China and in early spring in north China [4,5]. Temperate-season food legumes include common bean (*Phaseolus vulgaris* L.), runner bean (*Phaseolus multiflorus* Willd), lima bean (*Phaseolus lunatus* L.), and hyacinth bean [*Lablab purpureus* (L.) Sweet], suited to sowing in late spring [4,5]. Warm-season food legumes include mung bean (*Vigna radiata* wilczek), adzuki bean [*Vigna angularis* (Willd) Ohwi & Ohashi], cowpea (*Vigna unguiculata* L. Walp.), rice bean [*Vigna umbellata* (Thumb.) Ohwi and Ohashi], black gram [*Vigna mungo* (L.) Hepper], pigeon pea [*Cajanus cajan* (L.) Millsp.], velvet bean [*Mucuna pruriens* (L.) DC.], winged bean [*Psophocarpus tetragonolobus* (L.) DC.], guar bean [*Cyamopsis tetragonoloba* (L.) taubert], sword bean [*Canavalia gladiata* (Jacq.) DC.], and jack bean [*Canavalia ensiformis* (L.) DC.], which are summer-sown in China [4,5]. Soybean [*Glycine max* (L.) Merr.] and groundnut (*Arachis hypogaea* L.) are not treated as food legumes in China, but defined as oil crops [4].

Mung bean and adzuki bean originated partially in China [7,8] and faba bean and pea have been cultivated in China for over 2000 years [9,10], while common bean, cowpea, chickpea and lentil have been cultivated in China for hundreds of years [11–14]. Other pulse species appear sporadically in Chinese cropping systems [15–20]. Food legumes have played an important role in Chinese cropping systems for traditional and sustainable agriculture since ancient times [4,5]. Food legumes are also key nutritional components for dietary protein, vitamin B, and diversified recipes in traditional food dishes, ensuring the basic health of Chinese people [5,21]. Although 20 species of cultivated pulse crops can be found in China, nine of them, including faba bean, pea, common bean, mung bean, adzuki bean, lentil, chickpea, runner bean, and cowpea, are those most commonly seen in cropping systems [4–6].

2. Area and production of food legumes in China

Mung bean and adzuki bean originated partially in China [22], and faba bean and pea have been cultivated for more than

2000 years [4,6]. Common bean, cowpea, chickpea and lentil have been cultivated for hundreds of years [4,6]. Food legumes play an important role in Chinese cropping systems for traditional and sustainable agriculture since ancient times [5]. Food legumes are also key components providing dietary protein, vitamin B, and diversified recipes in ordinary food dishes, whose traditional preparation has ensured the basic health of Chinese people [5].

2.1. Distribution of food legumes

Cropping of the major food legume crops can be found in all provinces, autonomous regions, and suburban areas of big cities in China [4,6], but most of these crops are distributed unevenly (Table 1). For faba bean, 85% is sown in the winter cropping areas of the semi-tropical climate zone of China [23–26]. For pea, most production is in the semi-tropical climate zone as an upland winter crop [25,26]. Common bean and runner bean are cultivated mainly in southwest and northwest China [4,6]. Mung bean and adzuki bean are cultivated mainly in the northeast provinces [4,22]. Cowpea is cultivated mainly in the northeast and east of China [4,6]. Lentil and chickpea are cultivated mainly as winter crops in the northwest and as spring crops in the north and southwest of China, on dry and degraded land [4,6].

2.2. Harvesting area of major food legumes

Food legumes are favored foods in the daily life of Chinese people and have been important historically [5]. Dry food legume production rapidly decreased from above 10 million to 3 million ha from 1961 to 1992, increased to 4 million ha after two years, then kept steady after 1995 at 4–5 million ha. The proportion of vegetable food legume production has increased sharply during the past 15 years (Fig. 1). Owing to their short cropping duration and high market value, pea and common bean have become dominant vegetable food legumes in China [26,27]. Vegetable faba bean is following the same trend as pea and common bean. According to statistical data from National Center for Extension of Agronomic Techniques, Ministry of Agriculture, China [26], vegetable faba bean were cropped on 0.4277 million ha (6.416 million mu) in China in 2014.

Table 1 – Distribution of major food legumes in China[†].

Food legume	Distribution region	Main producing province or autonomous region
Faba bean	Southwest, East, Southeast, North	Yunnan, Sichuan, Chongqing, Guizhou, Gansu, Qinghai, Jiangsu, Zhejiang, Hebei, Anhui, Hubei, Ningxia, Inner Mongolia, Xinjiang
Pea	Southwest, Northwest, East, North	Gansu, Ningxia, Qinghai, Sichuan, Yunnan, Guizhou, Chongqing, Jiangsu, Hubei, Shanxi, Hebei, Shandong, Inner Mongolia, Xinjiang, Liaoning, Guangdong
Common bean	Southwest, Northeast, North	Heilongjiang, Inner Mongolia, Yunnan, Guizhou, Xinjiang, Hebei, Chongqing, Gansu, Shaanxi, Jilin, Shanxi, Sichuan, Shandong, Liaoning
Mung bean	Northeast, Middle, East, Southwest	Inner Mongolia, Jilin, Liaoning, Shaanxi, Henan, Shanxi, Hebei, Anhui, Shandong, Hubei, Sichuan, Chongqing, Guangxi, Xinjiang
Adzuki bean	Northeast, East	Heilongjiang, Jilin, Liaoning, Hebei, Inner Mongolia, Shanxi, Shaanxi, Shandong, Beijing, Tianjin, Gansu, Hubei
Lentil	North, Middle, Southwest	Henan, Shanxi, Shaanxi, Gansu, Xinjiang, Inner Mongolia
Chickpea	Northwest, North, Southwest	Gansu, Xinjiang, Inner Mongolia, Yunnan
Cowpea	Northeast, East	Henan, Hebei, Shandong, Liaoning, Guangxi, Hubei
Runner bean	Southwest, Middle	Yunnan, Guizhou, Sichuan, Shaanxi, Gansu, Shanxi

[†] Cited from Ministry of Agriculture (MOA) reference (unpublished) with editing.

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