

DISTRIBUTION OF THE MAIN CROP GERMPLASM RESOURCES IN CHINA

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ABSTRACT: This paper describes the characteristics and rules of geographical distribution of main crop germplasm resources, totally 194 634 accessions of germplasm of 73 crops. Among them, food crop germplasm have 161 574 accessions, making up 83% of the total number. The maps of geographical distribution of main food crops, fibre plants and oil crops are presented. The crop germplasm in China are distributed widely in the whole country. With regard to provinces, crop germplasm resources are more bountiful in Shanxi, Guangxi, Sichuan, Shandong, Yunnan, Shaanxi, Hebei, Henan, Guangdong and the total germplasm resources in these provinces are 112 185 accessions, making up 57.6% in the whole country. With regard to agricultural regions, crop germplasm resources at the middle and lower reaches of the Huanghe (Yellow) River are the most bountiful, which have 52 325 accessions, making up 26.9% in the whole country. The number of crop germplasm per million mu (1 ha = 15mu) of cultivated land is obviously different in different regions. The more bountiful the heat resources, the more complicated the terrain and the longer the history of agricultural planting, the richer the crop germplasm resources per million mu cultivated land will be.

KEY WORDS: crop, germplasm resources, China, distribution

Crop germplasm resources are the indispensable material base for crop breeding and agricultural production. The research on distribution of crop germplasm resources is of great importance in studying on origin, evolution and classification of crops, expediting and collecting germplasm, ascertaining of centers of diversity, protecting germplasm resources and making agricultural production division.

Since 1949, researches of exploration, collection, preservation, characterization and evaluation of crop germplasm resources have been done in China. At present, the national crop genebank and the Chinese Crop Germplasm Resources Information System(CGRIS) have been

set up. The data used in this paper comes from CGRIS(Zhang, 1991).

The researches on distribution of crop germplasm in China had been done, but only the simple description of various provinces were presented except wild rice(Wu, 1990) and semi-wild barley(ICGR,CAAS, 1988). This paper is the first in the history of researches on main crop germplasm resources in China.

The main crops discussed in this papers include main food crops (rice, wheat, barley, oat, foxtail millet, proso millet, corn, sorghum, buckwheat, soybean, food legumes, sweet potato, potato and wild soybean, wild rice, semi-wild barley etc.), fibre plants (cotton, ramie, flax, kenaf, jute and hemp), oil crops (rape, peanut, sesame, sunflower, perillaseed, safflower and castor bean), vegetables(radish, carrot, Chinese cabbage, cabbage, vegetable mustard, cucumber, wax gourd, watermelon, melon, eggplant, pepper, kidney bean, etc.), fruit trees (apple, pear, hawthorn, peach, plum, apricot, persimmon, jujube, citrus fruits, banana and litchi) and other crops (pasture and green manure crops, sugar beet, tobacco, tea and mulberry etc.), with totally 194 634 accessions of landraces and wild species. In this paper, the maps of geographical distribution of the main crops(Fig. 1), main food crop, fibre plants and oil crops are presented.

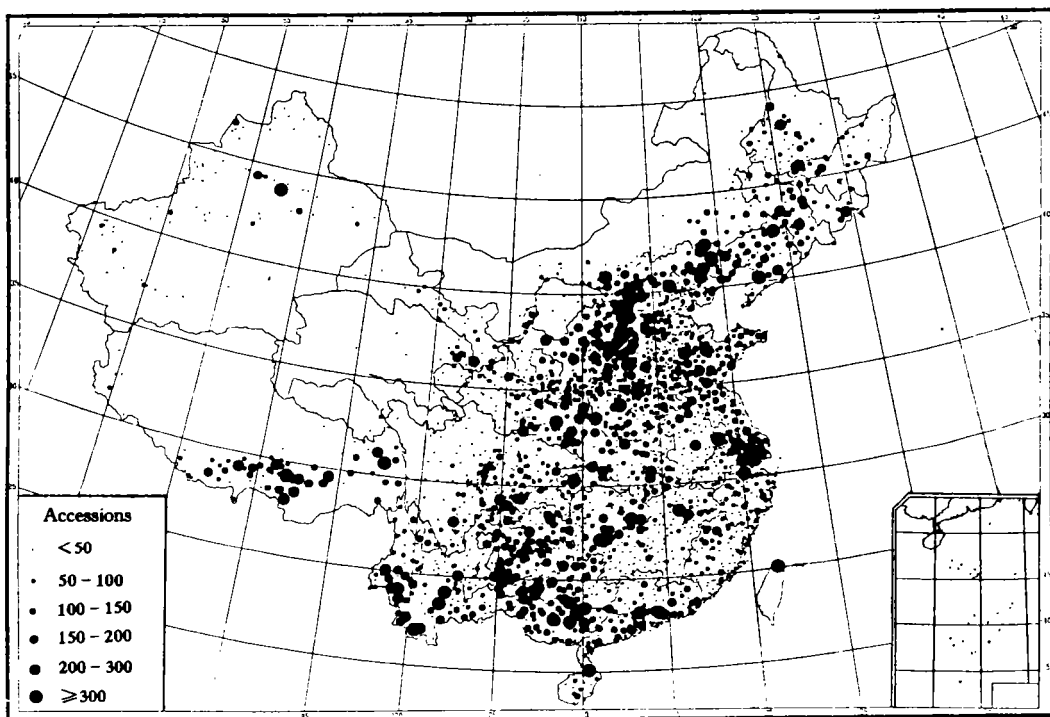


Fig. 1 Distribution of the main crop germplasm resources in China

I. DISTRIBUTION OF THE MAIN FOOD CROP GERmplasm

The germplasm resources of food crop in China are widely distributed in every agricultural

area of the whole country. There are four dense distributing areas(Fig.2): 1) the middle and lower valleys of the Huanghe River, including Shanxi, Hebei, Shandong, Henan provinces and southern Inner Mongolia. This area belongs to the semi-arid and semi-humid region of the temperate zone. It is appropriate to dry farming due to the flat terrain. It is the area with the longest history of agricultural production in China. The cultivation index is 60% - 70% and the land use efficiency takes the first in the whole country. This area has become the most concentrated region of germplasm resources of food crop in water-limited areas in China. 44 370 accessions of germplasm resources of food crop have been collected in this area, making up

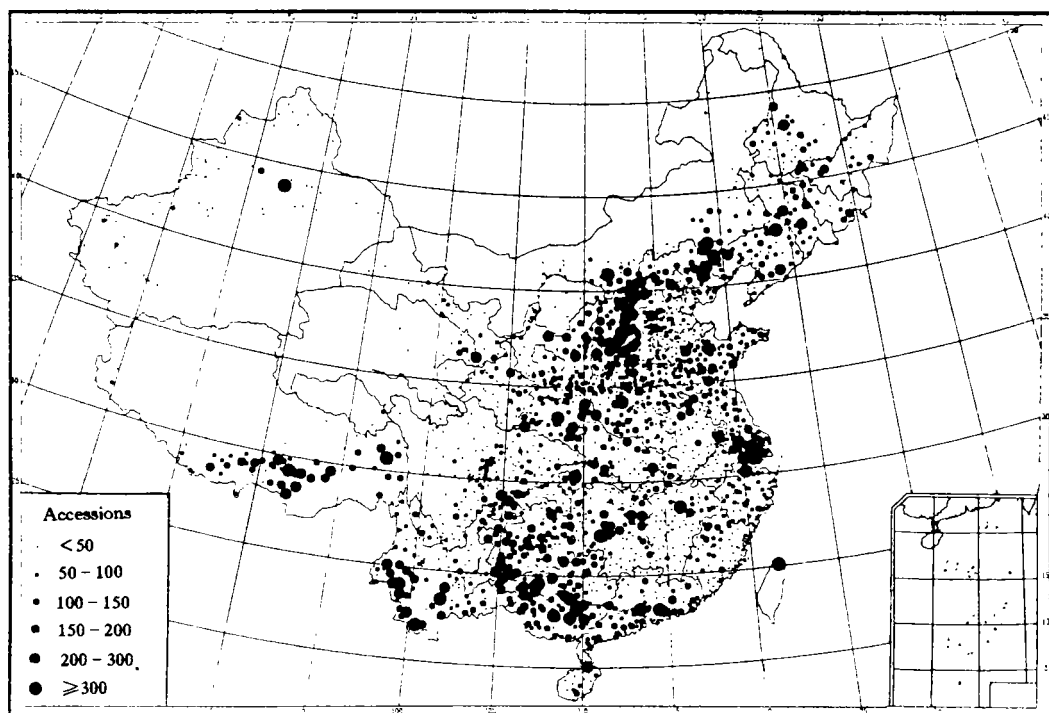


Fig.2 Distribution of the main food crop germplasm resources in China

27.4% of the total number in the whole country; 2) the Yunnan-Guizhou Plateau - Guangdong-Guangxi area, including Yunnan, Guizhou, Guangxi and Guangdong provinces. In this area, there are 38 662 accessions of food crop germplasm, making up 23.9% of the total number in the whole country. Among them, rice germplasm resources are the most abundant, with most wild rice in China. And 23 642 accessions of rice landraces have been collected, making up 50.4% of the total number in the whole country. In addition, this area is also the important distributing area of other crops, such as corn, buckwheat, soybean and sweet potato, respectively making up 32.4%, 15.7%, 18.3% and 14.8% of the total number in the whole country; 3) the Jiangsu and Zhejiang area, including Jiangsu Province and Zhejiang Province. This area belongs to the humid subtropics. It has fertile soils and dense network of inland rivers. Therefore, this area has become the main granary of China since the Tang Dynasty. The total

area in this region is about 0.2 million square kilometers and makes up 2% of total area of the whole country, but in this region, there are 11 167 accessions of germplasm resources of food crop, making up 7% of total number of the whole country; 4) the southern Xizang area, including the valleys of the Yarlung Zangbo River, the Nyangqu River and the Lhasa River. The area of this region is not large but 6788 accessions of germplasm resources of food crop have been collected, making up 4.2% of the total number of the whole country. This region is the important distributing area of barley and wheat landraces, making up 40.7% and 13% of the total number in the whole country, respectively, and is also the main distributing area of wild species of barley and wheat. In addition, in the southeastern Sichuan Province, the central Hunan Province and the western Fujian Province, there are a large number of germplasm resources of food crop but rice is the main crop. In Heilongjiang, Jilin and Liaoning provinces, there are a considerable number of germplasm resources of food crop, with totally 12 968 accessions, making up 8.0% of the total number in the whole country. Among them, soybean (4905 accessions), foxtail millet (1998 accessions), corn (1384 accessions) and sorghum (2042 accessions) respectively make up 22.1%, 10.1%, 12.9% and 20.9% of total number in the whole country. They are mainly distributed over the Songliao Plain in the Northeast China.

II. DISTRIBUTION OF THE MAIN FIBRE PLANT GERMPLASM

The geographical distribution of fibre plant in China (Fig. 3) is fundamentally affected by the pattern of geographical distribution of cotton. One reason is that cotton landraces(2771 accessions) make up 60% of total number of fibre plant landraces and ramie(935 accessions), jute (362 accessions), flax(332 accessions), hemp(134 accessions) and kenaf(109 accessions) respectively make up 22.1%, 10.1%, 12.9% and 20.9% of the total number in the whole country. Another reason is that some of fibre plants are affected by ecological conditions, especially different climatic conditions, so that the distribution of landraces of different fibre plants has certain complement for each other. For example, ramie, kenaf and jute prefer warm climates so that they are mainly distributed over the subtropics and the tropics. In China, they are mainly distributed over areas to the south of 35°N, where there are abundant heat and rain. Flax and hemp prefer cool conditions. High temperature is beneficial to development but is not beneficial to fibre growth so that they are mainly distributed over the temperate zone. In China, they are mainly distributed over areas to the north of 35°N. Only in Inner Mongolia, Zhejiang, Jiangxi, Hunan, Guangdong, Hainan, Guangxi, Guizhou, Gansu, Qinghai and Ningxia, cotton landraces are obviously less than that of other fibre plants. Hence, in these areas, the pattern of geographical distribution of other fibre plants is different from that of cotton.

III. DISTRIBUTION OF THE MAIN OIL CROP GERMPLASM

The oil crop germplasm resources in China have 9272 accessions(Fig. 4). Among the seven

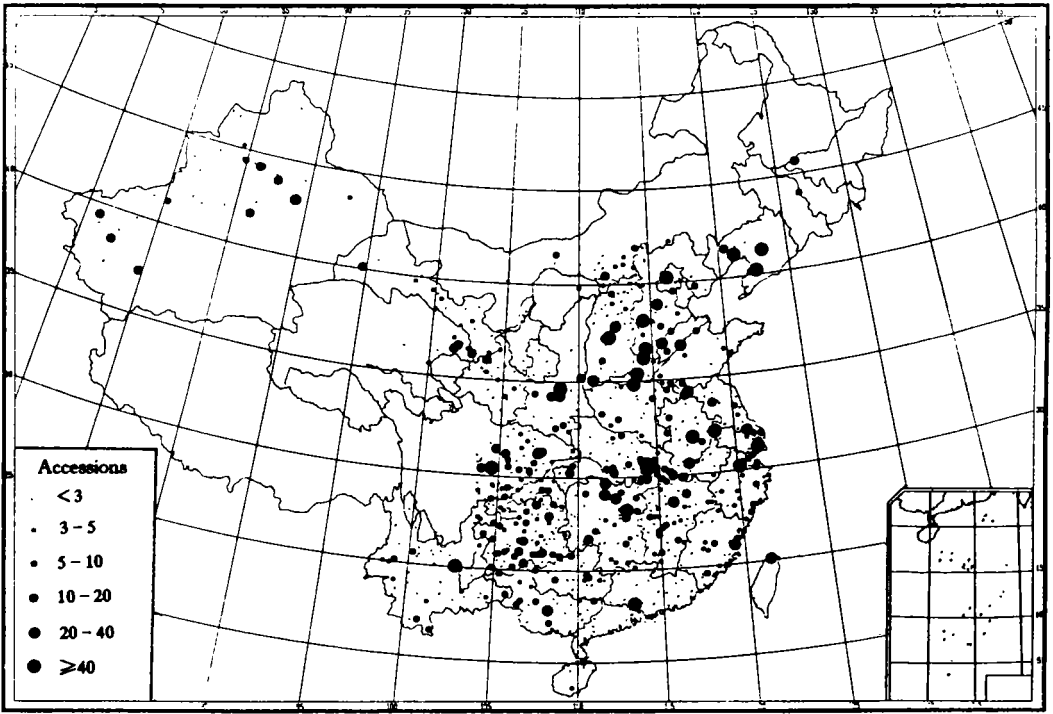


Fig.3 Distribution of the main fibre plant germplasm resources in China

main oil crops, the number of sesame landraces is the most (3012 accessions), making up 32.4% of the total number of oil crop landraces. The next is rape, making up 26.7%. The former is the main oil crops in areas to the north of the Changjiang River while the latter is the main oil crops in areas to the south of the Changjiang(Yangtze) River. The number of peanut landraces is the third, making up 20.9%. And sunflower accounts for 9.7%. They are almost distributed over the northern China. Castor bean makes up 6.7% and is almost distributed in the north also. Perillaseed and safflower make up 1.9% and 1.7%, respectively.

The geographical distribution of oil crop germplasm in China is very wide and obviously regional. For example, rape landraces are mainly distributed over the Changjiang River valley, the middle valley of the Huanghe River (Shaanxi, Shanxi, Gansu and Qinghai) and Xinjiang etc. . In the North China and the South China, peanut is the main oil crop. Sesame is drought-resistant and suffers easily from waterlogging, so that it is mainly distributed over areas to the north of the Changjiang River. Northern Anhui, Hubei, Henan, Shandong and Hebei are the distributing centres of sesame landraces. The distribution of germplasm resources of oil crop in China can be divided into six regions: 1) the Northeast China – Inner Mongolia region, in which sunflower is the principal oil crop. The germplasm resources of oil crop in this region have 1152 accessions, making up 12.4% of the total number in the whole country. In this region, there are 58.6% of sunflower landraces, 51.1% of perillaseed landraces and 32.5% of

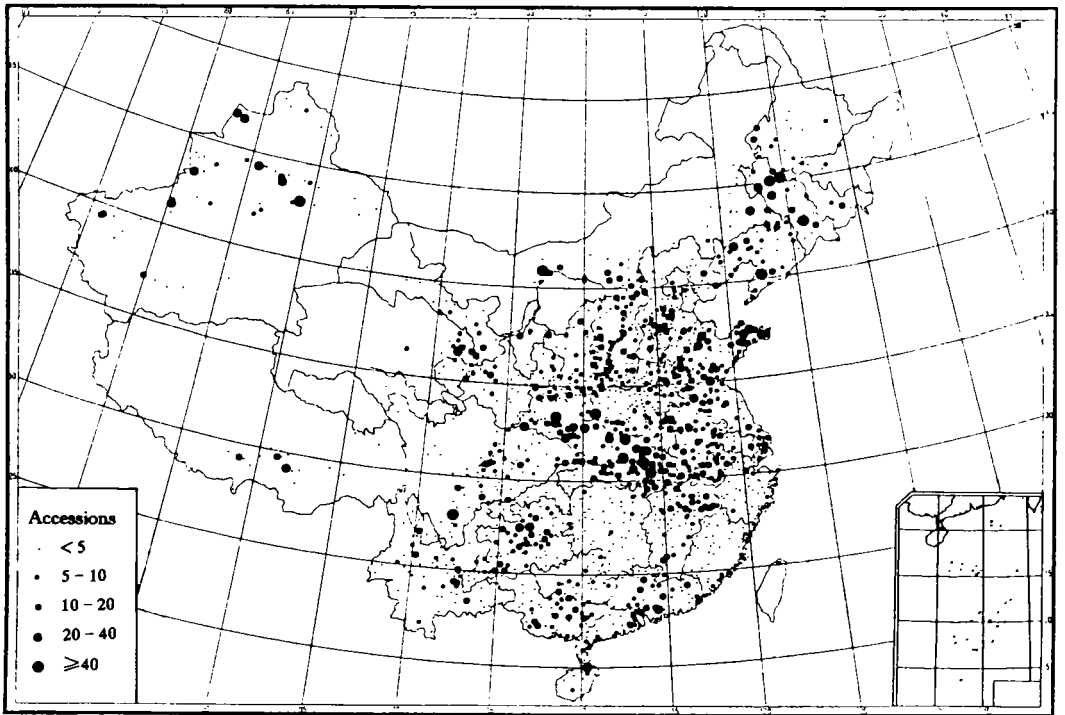


Fig.4 Distribution of the main oil crop germplasm resources in China

castor bean landraces of the whole of China; 2) the North China region, in which peanut and sesame are the main oil crops. In this region, there are 1319 accessions of oil crop landraces, making up 14.2% of the total number in China. There are 31.9% of sesame landraces and 27.1% of peanut landraces in the whole country; 3) the middle and lower valleys of the Changjiang River, including Hubei, Hunan, Anhui, Jiangxi, Jiangsu and Zhejiang. The oil crop landraces in this region make up 25.6% of those in the whole country. There exist 36.9% of sesame landraces, 26.9% of peanut germplasm and 26.7% of rape landraces in China; 4) the Southeast China region, including Guangdong, Guangxi and Hainan. The landraces in this region make up 8.0% in the whole country. This region hold 28.1% of peanut landraces in China and is the main distributing region of peanut germplasm in southern China; 5) the upper Valley of the Changjiang River, including Sichuan, Yunnan and Guizhou. The germplasm resources of oil crop in this region make up 12.1% of those in the whole country. There are 31.4% of rape landraces; 6) the western China region, including Shanxi, Shaanxi, Gansu, Qinghai, Xinjiang and Xizang. There are 1977 accessions of germplasm resources of oil crop, making up 21.3% of the whole country. Among them, there are 714 accessions of rape landraces, making up 36% of total accessions in this region and 28.9% of total rape germplasm in the whole country. This shows that this region takes rape as the main oil crops.

IV. CONCLUSION

China is an important center for the origin of crops in the world. And now 350 000 accessions of crop germplasm have been collected. This paper describes the characteristics and rules of geographical distribution of main food crop, fibre plant and oil crop germplasm resources, totally 194 634 accessions of germplasm of 73 crops.

(1) There are four dense distributing areas of food crop: the middle and lower valleys of the Huanghe River, the Yunnan-Guizhou Plateau – Guangdong – Guangxi area, the Jiangsu and Zhejiang area and the southern Xizang area.

(2) The distribution of landraces of different fibre plants has certain complement for each other. For example, ramie, kenaf and jute prefer warm climates so that they are mainly distributed over the areas to the south of 35°N. Flax and hemp prefer cool conditions so that they are mainly distributed over the areas to the north of 35°N.

(3) The distribution of germplasm resources of oil crop in China can be divided into six regions: the Northeast China – Inner Mongolia region, the North China region, the middle and lower valleys of the Changjiang River, the Southeast China region, the upper valley of the Changjiang River and the western China region;

(4) The number of crop germplasm per million mu of cultivated land is obviously different in different regions. The more bountiful the heat resources, the more complicated the terrain and the longer the history of agricultural planting, the richer the crop germplasm resources per million mu cultivated land will be.

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