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Thoughts on Pairing Assistance to Tibet for Promoting Agricultural High-quality Development in Southern Tibet from the Perspective of Agricultural Power

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Abstract In the new era, there is an urgent need to further promote pairing assistance to Tibet, promote the simultaneous construction of a strong agriculture in China, and compose a Chinese-style modernization. Southern Tibet, located in the southeastern part of the Tibet Autonomous Region, includes Shannan City and Nyingchi City, is a region assisted by four provincial partners including Hubei Province. This paper introduces the agricultural environment in southern Tibet, studies its agricultural characteristics, and analyzes the main issues of its pairing assistance. Taking forging the strong consciousness of the Chinese national community as the main line, the paper explores strategies for promoting agricultural high-quality development in southern Tibet through pairing assistance to Tibet from the perspective of agricultural power, and proposes some strategies, such as inheriting agricultural cultural heritage, promoting the upgrading of modern seed industry, enhancing the characteristic advantages of highland barley (naked barley) and animal husbandry industries, and developing edible fungi and cold water fish industries.

Key words Pairing assistance to Tibet, Southern Tibet, Shannan City, Nyingchi City, Agricultural high-quality development, Agricultural power

1 Introduction

Pairing assistance is a policy act in which the economically developed or strong party provides assistance to the economically underdeveloped or weaker party, mainly in the form of disaster assistance, economic, medical, and education assistance. The project of pairing assistance to Tibet began in 1994 when the central government convened the Third Tibet Work Forum[1]. At present, 20 provinces and municipalities (including Sichuan Province, which no longer undertakes the task of assisting Tibet, but has instead assumed the responsibility of supporting Tibetan areas in Sichuan Province), 17 central enterprises, and dozens of central ministries and commissions have participated into the pairing assistance to Tibet. Since 2010, Tibetan areas in Qinghai, Sichuan, Yunnan, and Gansu provinces have been included into the scope of pairing assistance to Tibet[2].

Southern Tibet, located in the southeastern part of the Tibet Autonomous Region, includes Shannan City and Nyingchi City, is a region assisted by four provincial partners (Hubei, Hunan, Anhui, and Guangdong). It is a part of the "Three Regions and Three Prefectures" of the severely impoverished areas of the country. Shannan City now has jurisdiction over 1 district, 1 county-level city and 10 counties. Among them, Hubei provides pairing assistance to Eastern District, Zha'nang County, Qiongjie County, Qusong County, and Gacha County; Hunan provides pairing assistance to Gongga County, Sangri County and Longzi County; Anhui provides pairing assistance to Cuona City, Langkazi County, Cuomei County and Luozha County. Nyingchi City now has jurisdiction over one district, one county-level city and five counties. Among them, Guangdong provides pairing assistance to Bayi District, Bomi County, Chayu County, Motuo County, Milin City, Lang County and Gongbujiangda County.

By 2024, it has been 30 years since the launching of pairing assistance project to Tibet, and fruitful achievements have been made[1-3]. The project has promoted the economic construction, political construction, cultural construction, social construction and ecological civilization construction of Tibet and Tibetan areas in four provinces, promoted the exchanges and exchanges between Tibet and other provinces, and firmly established the consciousness of the Chinese nation community. In the past, pairing assistance to Tibet focused more on medical support, doctors, education, teachers, and cadres, but the high-quality development of agriculture in Tibetan areas has not received due attention. Improving the quality and effectiveness of pairing assistance to Tibet[3-7] has always been an important issue, especially in the new era. The report of the 20th National Congress of the Communist Party of China proposed to "accelerate the construction of a

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new development pattern and focus on promoting high-quality development", "accelerate the construction of an agricultural power", and "comprehensively promote the great rejuvenation of the Chinese nation with Chinese-style modernization", and summarized the five characteristics of Chinese-style modernization. In 2023, the No. 1 Central Document proposed that "it is required to base on national conditions and agricultural conditions, reflect Chinese characteristics, and build an agricultural power with strong supply security, strong scientific and technological equipment, strong management system, strong industrial resilience, and strong competitiveness". In 2024, the No. 1 Central Document required that "we should ensure national food security", "ensure that there is no large-scale return to poverty", and "improve the level of rural industry development", *etc.* Obviously, it is urgent to further promote pairing assistance to Tibet in the new era, and promote the simultaneous construction of Tibetan areas and the inland into the agricultural power, and the simultaneous adoption of a new path of Chinese-style modernization. In view of these, we studied the strategy of pairing assistance to Tibet to promote the high-quality development of agriculture in Shannan City and Nyingchi City in southern Tibet from the perspective of agricultural power.

2 Agricultural environment of southern Tibet

2.1 Shannan City Shannan City in southern Tibet is bordered by Lhasa City in the north, Shigatse City in the west, Nyingchi City in the east, and India and Bhutan in the south, with a border of 630 km. It is located in the eastern section of the Himalayas, the south of the Gangdis Mountain – Nianqing Tanggula Mountains on the Qinghai – Tibet Plateau, and in the middle reaches of the main stream of the Brahmaputra River (Yarlung Zangbo River). With the plateau as the main body, the terrain is complex, gradually decreases from west to east, the mountains are high and the valleys are deep, and the climate types are numerous, forming the diversity, multi-level and discontinuity of climate resources, with an average altitude of 3 700 m. The northern part is a wide valley area, the central part is dominated by alpine lake basin plains, and the southeastern part is a high mountain and deep valley area.

Shannan City has longitudinal and latitudinal zonal changes, belonging to the semi-arid monsoon climate of the plateau temperate zone. The west is cold and dry, while the southeast and the Yarlung Zangbo River are warm and humid, with an average annual precipitation of 404.1 mm. Its rivers and lakes are numerous. There are 445 rivers with a drainage area of more than 50 km^2 (including 107 rivers with a drainage area of more than 200 km^2) and 199 lakes (including 24 lakes with a water area of more than 1 km^2). The middle reaches of the Yarlung Zangbo River, the largest river, form a broad area 302 km long in Shannan City, with a maximum width of 7 km. There are also rivers such as Kanla River, Kru River, Kamen River, Yalong River, Wenqu River, Woka River and Zengqi River. The main lakes are Yamdrok-tso, Pumoyum-tso, Nariyum-tso, Zhegu-tso and Pagyu-tso. The Yamdrok-tso water system is the largest inland water system in southern Tibet.

Shannan City has a total land area of 79 300 km^2 (including 31 300 km^2 in the Indian-occupied area of Cuona City and Longzi County). The cultivated land area is 64 600 ha, the plantation land is 4 000 ha, the forest land area is 3 677 300 ha, the grassland area is 2 888 500 ha, the urban village and industrial and mining land area is 19 500 ha, the transportation land area is 18 700 ha, the wetland area is 94 500 ha, the water area and water conservancy facilities land area is 325 900 ha, and other land area is 831 900 ha.

2.2 Nyingchi City Nyingchi City in southern Tibet is adjacent to Lhasa City in the west, Shannan City in the southwest, Nagqu City in the north, Yunnan Province and Changdu City in the east and northeast, and India and Myanmar in the south, with a border line of about 1 007 km. Nyingchi City is located in the middle and lower reaches of the Yarlung Zangbo River, with the Nyenchen Tanglha Mountains in the north, the eastern section of the Himalayas in the south, the Gangdise Mountains in the northwest, and the Hengduan Mountains in the east. The first three mountains run from east to west, and the latter mostly from north to south. The general trend of the landform is that it inclines from northwest to southeast, with typical high mountains, canyons and mountain valleys, with an average altitude of 3 100 m. Nyingchi City has rich climate types, dominated by plateau temperate semi-humid monsoon climate, and mainly a variety of climatic zones coexisting with tropical, subtropical, temperate and frigid climates. The vertical pattern is complete, and some mountains have all the climatic zones in the northern hemisphere from the mountain tropics to the alpine frigid zone from bottom to top. Its rivers and lakes are numerous. These rivers mainly belong to the Yarlung Zangbo River and the Nujiang River, and the other rivers are Jitaiqu, Chayuqu and Danlongqu. Rivers and streams slope from north to south because of the terrain, and the river flows south. The larger lakes are Cuogao Lake, Yigong Lake, Palong Lake, Guxiang Lake and Baga Lake. Nyingchi City has a total land area of 114 900 km^2 (including 41 000 km^2 of Indian-occupied area, including most of Medog County and Chayu County and a small amount of territory in Milin City and Lang County). The actual area of cultivated land is 19 200 ha, garden land is 8 800 ha, forest land is 6 074 300 ha, grassland is 2 048 300 ha, water area is 766 000 ha, residential area and industrial and mining land is 4 600 ha, and unused land area is 2 546 800 ha.

3 Agricultural characteristics of southern Tibet

3.1 Production of agricultural products According to the *Statistical Bulletin of National Economic and Social Development of*

Shannan City, the planting area of grain crops in the whole city in 2022 was 25.48 thousand ha, including 18.29 thousand ha of highland barley (naked barley) and 6.56 thousand ha of wheat. The planting area of rapeseed and vegetable was 2.53 thousand ha and 2.57 thousand ha, respectively. The total annual grain yield of Shannan City was 169 200 t, including 114 400 t of highland barley and 52 300 t of wheat. The yields of rapeseed and vegetables were 76 thousand t and 67 thousand t, respectively. The annual output of pork, beef, mutton and poultry was 24.14 thousand t, including 2.49 thousand t of pork, 17.35 thousand t of beef, 3.50 thousand t of mutton and 0.79 thousand t of poultry. The output of eggs and milk was 6.24 and 72.78 t, respectively.

According to the *Statistical Bulletin of National Economic and Social Development of Nyingchi City*, the planting area of grain crops in the city in 2022 was 19.13 thousand ha, including 5.80 thousand ha of highland barley and 8.57 thousand ha of wheat. The planting areas of oilseeds (mainly rapeseed) and vegetables were 1.80 thousand ha and 2.73 thousand ha, respectively. The total annual grain yield of Nyingchi City was 90 154.390 t, an increase of 6.09%. The yield of highland barley was 22 695.740 t, the yield of wheat was 40 105.8 t, the yield of corn was 21.67 thousand t, and the yield of beans was 0.39 thousand t. The yield of oil crops and vegetables was 3.13 thousand t and 37.60 thousand t, respectively. Its total annual meat output was 15.42 thousand t, including 5.37 thousand t of beef, 0.11 thousand t of mutton and 8.13 thousand t of pork. The output of eggs and milk was 1.82 thousand t and 28.54 thousand t, respectively.

3.2 Types of agricultural products Shannan City and Nyingchi City are relatively low-altitude areas in Tibet, rich in highland barley, wheat, broad beans, peas, corn, buckwheat, rape and other grain and oil crops. Vegetables include potatoes, radishes, cabbages, peppers, beans, tomatoes, pumpkins and so on. Edible fungi planted on a large scale include *Pleurotus ostreatus*, *Hypsizygus marmoreus* (Peck) H. E. Bigelow, *Agaricus bisporus* (Large) Sing., *Flammulina velutipes*, *Morchella esculenta* (L.) Pers., *Hericium erinaceus* (Bull.) Pers., *Auricularia auricula* (L. ex Hook.) Underw, *etc.* Fruits include apples, pears, walnuts, peaches, grapes, and so on. There are hundreds of medicinal plants in these two cities, including *Ophiocordyceps sinensis*, *Rheum palmatum*, *Fritillaria* spp., *Echeveria laui*, *Salvia miltiorrhiza*, *Angelica sinensis*, *Codonopsis pilosula*, *Hippophae rhamnoides*, *Lycium chinense*, and *Ganoderma lucidum*, *etc.* Animal husbandry in southern Tibet includes yaks, cattle, cattle, goats, sheep, horses, donkeys, mules, pigs, chickens, ducks and honey. Aquatic animals include cold-water fish such as *Schizothorax prenanti*, *Schizothorax grahami*, *Gymnocypris waddelli*, salmon, salmon trout, *Myxocyprinus asiaticus* and *Protosalanx hyalocranius*.

3.3 National grain production functional area The State Council issued the Guiding Opinions on the *Establishment of Grain Production Functional Areas and Important Agricultural Product Production Conservation Areas* (Guo Fa [2017] No. 24), deploying the establishment of three major grain production functional areas for rice, wheat and corn and five important agricultural product production protection areas such as soybean, cotton, rapeseed, sugar cane and natural rubber. Combined with the local reality, Tibet has designated 240 000 ha of grain production functional areas in 52 major grain-producing counties (districts and cities) in the five cities of Lhasa, Shigatse, Changdu, Nyingchi and Shannan, of which 204 000 ha was for highland barley and 36 380 ha was for wheat.

The grain production functional area of Shannan City was 47 706 ha, accounting for 19.88% of the whole autonomous region. Specifically, the highland barley production functional area was 30 947 ha, accounting for 15.20% of the whole autonomous region; the wheat production functional area was 16 760 ha, accounting for 46.07% of the whole autonomous region. The highland barley production functional area of Shannan City included 4 047 ha in Naidong District, 3 820 ha in Zha'nang County, 5 353 ha in Gongga County, 1 887 ha in Sangri County, 1 933 ha in Qiongjie County, 1 633 ha in Qusong County, 753 ha in Cuomei County, 2 426 ha in Luozha County, 2 147 ha in Jiacha County, 3 020 ha in Longzi County, 1 020 ha in Cuona City and 2 909 ha in Langkazi County.

The grain production functional area of Nyingchi City was 8 667 ha, accounting for 3.61% of the whole autonomous region. Specifically, the highland barley production function area was 3 533 ha, accounting for 1.74% of the whole autonomous region; the wheat production function area was 5 133 ha, accounting for 14.11% of the whole autonomous region. The highland barley production functional areas of the city includes 400 ha in Bayi District, 400 ha in Gongbujiangda County, 267 ha in Milin County, 1 000 ha in Bomi County, 800 ha in Chayu County and 667 ha in Lang County. The wheat production functional area was 467 ha in Bayi District, 333 ha in Gongbujiangda County, 1 200 ha in Milin County, 2 000 ha in Bomi County, 800 ha in Chayu County and 333 ha in Lang County.

3.4 Advantageous area of agricultural products with Chinese characteristics During the period from 2017 to 2020, nine ministries and commissions, including the Ministry of Agriculture and Rural Affairs, jointly identified a total of 308 advantageous areas of Chinese characteristic agricultural products in the whole country in four batches, five of which are located in Tibet.

3.5 Advantageous counties of national characteristic agricultural products China's *Regional Distribution Plan for Characteristic Agricultural Products* (2013 – 2020) determined the development of 144 kinds of characteristic agricultural products in 10 categories. Highland barley, specialty walnuts, *Fritillaria cirrhosa*, Tibetan sheep, high-quality local chicken and characteristic bee products are involved in Shannan City, while highland barley, characteristic walnut, *Zanthoxylum bungeanum*, *F. cirrhosa*, Tibetan pig, Tibetan sheep, high-quality local chicken and characteristic bee products are involved in Nyingchi City (Table 1).

3.6 National "one village, one product" demonstration villages and towns There are three national "one village, one product" demonstration villages and towns in southern Tibet. Among them, there are two in Shannan City: Gongkang Village, Lengda Township, Jiacha County, and Tamu Village, Sangri Town, Sangri County, and their leading products are walnut and grape, respectively. One demonstration village in Nyingchi City: Cuogao Village, Cuogao Town, Gongbujiangda County, and its leading product is Tibetan miniature pig.

Table 1 Advantageous counties of characteristic agricultural products in southern Tibet

Characteristic agricultural products	Advantageous counties
Highland barley	Naidong District, Zha'nang County, Gongga County, Sangri County and Longzi County in Shannan City; Milin City and Bomi County in Nyingchi City
Specialty walnuts	Jiacha County in Shannan City; Milin City, Chayu County and Lang County in Nyingchi City
Z. bungeanum	Chayu County and Lang County in Nyingchi City
F. cirrhosa	Naidong District, Zha'nang County, Gongga County, Sangri County, Qiongjie County, Qusong County, Cuomei County, Luozha County, Jiacha County, Longzi County, Cuona City and Langkazi County in Shannan City; Bayi District, Gongbujiangda County, Milin City, Motuo County, Bomi County, Chayu County and Lang County in Nyingchi City
Tibetan pig	Bayi District, Gongbujiangda County, Milin City, Motuo County, Bomi County and Lang County in Nyingchi City
Tibetan sheep	Naidong District, Zha'nang County, Gongga County, Sangri County, Qiongjie County, Qusong County, Cuomei County, Luozha County, Longzi County, Cuona City and Langkazi County in Shannan City; Gongbujiangda County in Nyingchi City
High-quality local chicken	Naidong District, Zha'nang County, Gongga County, Sangri County, Qiongjie County, Qusong County, Cuomei County, Luozha County, Jiacha County, Longzi County, Cuona City and Langkazi County in Shannan City; Bayi District, Gongbujiangda County, Milin City, Motuo County, Bomi County, Chayu County and Lang County in Nyingchi City
Characteristic bee products	Naidong District and Zha'nang County in Shannan City; Bayi District and Bomi County in Nyingchi City

3.7 National modern agricultural industrial park and strong agricultural industry town In 2017 and 2019, the Ministry of Agriculture and Rural Affairs and the Ministry of Finance jointly launched the establishment of a national modern agricultural industrial park and the construction of a strong agricultural industry town. There are 2 national modern agricultural industrial parks in southern Tibet: Modern Agricultural Industrial Park in Gongbujiangda County and Modern Agricultural Industrial Park in Bomi County; there are 11 national agricultural industrial towns: Dalong Town in Langkazi County, Se Township and Zhari Township in Luozha County, Rong Township in Sangri County, Jiacha Town in Jiacha County, Qiangna Township in Milin City, Lang Township, Jindong Township and Dengmu Township in Langxian County, Bahe Town in Gongbujiangda County and Motuo Town in Motuo County.

3.8 Industrial clusters with national advantages and characteristics In 2020, the Ministry of Agriculture and Rural Affairs and the Ministry of Finance jointly launched the construction of national advantageous and characteristic industrial clusters, and a total of 180 construction lists have been listed in four batches. Among them, the ones related to southern Tibet are: Tibet Highland Barley Industrial Cluster, Tibet Yak Industrial Cluster, Tibetan Tibetan Sheep Industrial Cluster, Tibetan Cashmere Goat Industrial Cluster, and Tibetan Tibetan Chicken Industrial Cluster.

3.9 Agricultural heritage and traditional knowledge Southern Tibet is rich in agricultural and cultural heritage resources, featuring the agricultural culture of the middle and lower reaches of the Yarlung Zangbo River and the mountain agricultural culture of the eastern vertical zone of Nyingchi City, with unique land use systems and agricultural landscapes, especially the traditional agricultural production systems of highland barley, rape, walnut, yak, Tibetan pig, Tibetan miniature pig, Tibetan sheep and Tibetan chicken. There are important agricultural cultural heritages in China, such as Naidong Highland Barley Planting System and Gongbujiang Dazang pig breeding system, but there is no globally important agricultural cultural heritage system.

Agricultural intangible cultural heritage in southern Tibet is diverse, including the world intangible cultural heritage Tibetan medicine bath method related to medicinal materials, the knowledge and practice of life, health and disease prevention and control of Tibetans in China, and Tibetan state codes, mat weaving techniques, wool textile and rolling techniques, Tibetan incense production techniques, Tibetan medicine, Wangguo Festival, Shoton Festival (Tibetan Opera Festival) and other national intangible cultural heritages, as well as "Masan" Zanba dry food production techniques, Bomi bamboo weaving techniques, Tibetan leather goods production techniques, Tibetan weaving techniques, Tibetan miniature pig cooking techniques in Gongbujiangda County, Senburi glue making techniques and other autonomous region-level intangible cultural heritage, as well as the myth of Prince Achu.

Southern Tibet is rich in highland barley cultural heritage. The large ash pit (H2) of the Changguogou cultural site (late Neolithic Age) in Gongga County has obtained the remains of highland barley, wheat, peas and other crops from the West, as well as millet and other plants from the Yellow River Basin. It proves that southern Tibet has a history of planting and eating highland barley for more than 3 500 years. Although the origin and domestication history of highland barley has the dispute between "introduction theory" and "domestication theory"[8], the route of highland barley moving into Tibet has the difference between the southern route[8] and the northern route[9]. Zedang highland barley is one of the five famous highland barleys in Tibet. It is the tribute of highland barley of the Tubo Dynasty (633-842 AD) and has a long tribute culture.

3.10 Genetic resources of agricultural organisms Southern Tibet Plateau is rich in agricultural biological genetic resources, including highland barley, wheat, corn, broad bean, pea, buckwheat, potato, rape, walnut, apple, grape, pepper, pepper, morel, matsutake and tea. There are also plant genetic resources of Tibetan medicines (especially *Cordyceps sinensis*, *Ganoderma lucidum*, *Gastrodia elata*, *Crocus sativus* (saffron), *Rheum palmatum*, *Carum carvi*, *Anisodus tanguticus*, *Codonopsis thalictrifolia*, *Saussurea medusa*, *Rhodiola algida* (Ledeb.) Fisch. et Mey., *Salvia miltiorrhiza* Bge., *Panax pseudoginseng*, *Morinda officinalis*, and *Inula racemosa*, *etc.* Among, Shannan City has more than 80 local varieties of highland barley, such as Ainima, Chajiu highland barley, Cuona highland barley, Jiacha Liulengbai highland barley, Langkazi highland barley, Naidonglan, Shannan purple highland barley, Zedang highland barley, Zhaluohong highland barley and Zuoxianaguo; in Nyingchi City, there are more than 500 local varieties of highland barley, such as Balisha, Baizimang, Jinda highland barley, Menba highland barley, Milin highland barley, Songchilengdeng, Yarlung Zangbo highland barley, Changmang purple shell highland barley, Zizhu, and Zoma Sangbu.

In addition, there are Tibetan pig, Tibetan miniature pig, Niangpu Niangya yak, Xiangda yak, Cuomei yak, Suge sheep, Tibetan chicken, Chinese bee, *Schizothorax prenanti*, *Schizothorax grahami*, *Gymnocypris waddelli* and other animal genetic resources in southern Tibet. In the *List of National Livestock and Poultry Genetic Resources* (2021 edition), there are Tibetan pigs, Tibetan cattle, Niangya yaks, Tibetan alpine yaks, Tibetan sheep, Tibetan goats, Tibetan horses, Tibetan donkeys, Tibetan chickens and other national livestock and poultry genetic resources in southern Tibet.

3.11 Agricultural science and technology innovation The Ministry of Agriculture and Rural Affairs has identified a total of 190 regional breeding bases and large seed production counties. Among them, there is a highland barley regional breeding base in southern Tibet – Zha'nang County, Shannan City. Although there are abundant agricultural biological genetic resources, southern Tibet has not been granted the rights of new agricultural plant products, new forest and grass plant products, new animal products and new aquatic animal products, and there are no national crop, livestock and poultry, aquatic seed enterprises.

The southern Tibet has obtained few national patents. In the field of agriculture (International Patent Classification A01), Shannan City has obtained 14 national invention patents and 55 national utility model patents, and Nyingchi City has obtained 87 national invention patents and 95 national utility model patents. In the field of plant breeding (International Patent Classification A01H), Shannan City has not obtained national invention patents and national utility model patents; Nyingchi City has obtained 11 national invention patents and 5 national utility model patents. In the field of animal breeding (International Patent Classification A01K), Shannan City has obtained 1 national invention patent and 11 national utility model patents; Nyingchi City has obtained 14 national invention patents and 24 national utility model patents.

3.12 Agricultural brand development According to *National List of Famous and Excellent New Agricultural Products Collection and Registration Information System* issued by the Ministry of Agriculture and Rural Affairs's, Nyingchi City has been selected as 6 kinds of national famous and excellent new agricultural products: Langxian pepper, Motuo fungus, Yigong red (black tea), Motuo green tea, Milin white meat *Ganoderma lucidum*, and Bomi gastrodia, but Shannan City does not.

There are 17 kinds of geographical indication products in southern Tibet[10]: Chayu rice, Longzi black highland barley, Longzi black highland barley Zanba, Chayu Longzhao millet, Luozha vermicelli, Jiacha walnut, Nyingchi walnut, Nyingchi matsutake, Nyingchi *Ganoderma lucidum*, Nyingchi *Gastrodia elata*, Tibetan saffron, Nyingchi Tibetan miniature pig, Milin Tibetan chicken, Zeter (wool), Tibetan carpet, Zha'nang pulu (wool weaved products), Nyingchi honey. There are 39 registered geographical indication trademarks[11] in southern Tibet: Longzi black highland barley, Longzi black highland barley Zanba, Loza vermicelli, Changguo red potato, Bomi rapeseed oil, Jiacha walnut, Lang County Millennium walnut, Chayu kiwifruit, Chayu pomegranate, Bomi pepper, Chayu pepper, Lang County pepper (21731080; 21731118), Bomi Morchella, Nyingchi *Tricholoma matsutake*, Nyingchi *Ganoderma lucidum*, Nyingchi *Gastrodia elata*, Bomi *Gastrodia elata*, Nyingchi tea, Motuo tea, Gongbujiangda Tibetan pig, Linzhi Tibetan miniature pig, Naidong Tibetan fragrant pig, Niangpu Niangya yak (19066776; 19578922), Xiangda yak (50729326; 50711050), Cuomei yak, Longzi black and white dairy cow, Suge sheep (22941454; 22972420), Suge sheep wool, Naidong Tibetan chicken, Longzi Tibetan black chicken, Longzi Tibetan black egg, Bomi honey, Yanghu *Gymnocypris waddelli* (52256250; 52323819), and Motuo bamboo weaving.

There are 16 geographical indications of agricultural products registered in southern Tibet[12]: Chayu rice, Naidong highland barley, Longzi black highland barley, Chayu chicken feet (*Panicum miliaceum*), Changguo red potato, Chayu peanut, Jiacha walnut, Gulang County walnut, Nyingchi apple, Chayu kiwifruit, Langxian pepper, Yigong pepper, Menyu Foya Yuluogangji (plateau green tea), Bomi *Gastrodia elata*, Gongbujiangda Tibetan pig, Bomi honey.

The Ministry of Agriculture and Rural Affairs has stopped the certification of pollution-free agricultural products and replaced it with the certification of edible agricultural products.

There are many green food and organic food certification agencies in China, such as China Green Food Development Center and China Organic Food Certification Center. According to China Green Food Development Center, there are 51 valid green food certificates for agricultural products in Shannan City, with a total approved annual yield of 3 467.6 t of green food, involving walnuts, walnut oil, yellow peaches, apples, grapes, peppers, tomatoes, asparagus, beef, pork, eggs, buckwheat leaf tea, involving 12 corresponding operators. There are 37 valid green food certificates for agricultural products in Nyingchi City, with a total approved annual yield of 5 161.6 t of green food, involving peanuts, yellow oranges, yellow peaches, crisp peaches, dried Tibetan winter peaches, waxberries, cherries, apples, grapes, blueberries, kiwifruit, pomegranates, peppers, dried peppers, peppers, beef, eggs, chrysanthemum tea, rose tea, involving 14 corresponding

operators. However, for the national standardized production base of green food raw materials, there is only the highland barley standardized production base in Naidong District.

4 Main problems of pairing assistance in southern Tibet

4.1 Insufficient attention to agricultural cultural heritage Southern Tibet has not paid sufficient attention to agricultural cultural heritage, such as unique land use system and agricultural landscape, traditional processing techniques of famous and high-quality specialties, biological genetic resources, human factors of geographical indications, and cultural connotations of Tibetan medicinal materials.

4.2 Lagging development of facility agriculture The improvement in valley agricultural irrigation system, the upgrading of planting and breeding facilities, and the construction of high-standard farmland have not received due attention, and the development of facility agriculture has lagged behind.

4.3 Weak agricultural science and technology innovation Pairing assistance to Tibet is not strong enough for agricultural science and technology innovation, resulting in limited agricultural science and technology innovation capacity in the region so far, especially the cultivation of new varieties of agricultural plants, forest and grass plants, livestock and poultry, aquatic animals, as well as the creation of national invention patents and national new utility patents in the field of biological breeding.

4.4 No due attention to agricultural support Pairing assistance to Tibet focuses on medical support, education support, cadre assistance, but agricultural support has not received due attention, especially the effective connection with high-quality agricultural development and rural revitalization.

5 Recommendations for pairing assistance to Tibet to promote high-quality agricultural development in southern Tibet

5.1 Inheriting the agricultural cultural heritage and promote the inheritance and development of excellent traditional Chinese culture It is recommended to investigate the unique land use system and agricultural landscape of Shannan City and Nyingchi City, especially the traditional agricultural production systems of highland Barley, rapeseed, walnut, yak, Tibetan pig, Tibetan miniature pig, Tibetan sheep and Tibetan chicken, protect China's important agricultural cultural heritage Naidong highland barley planting system and Gongbu Jiangda Tibetan pig breeding system, and actively declare China's important agricultural cultural heritage and strive for globally important agricultural cultural heritage systems (GIAHS). Besides, it is necessary to collect and sort out the traditional processing techniques of special products, analyze the humanistic factors of their geographical indications, excavate the cultural connotation of Tibetan medicinal materials and famous and high-quality specialties, inherit agricultural cultural heritage, and promote the inheritance and development of excellent traditional Chinese culture such as the survey project of Chinese cultural resources in southern Tibet, the inheritance and development project of intangible cultural heritage, the inheritance and protection project of agricultural culture, and the project of promoting traditional Chinese medicine culture.

5.2 Implementing the action plan for the revitalization of the seed industry and promoting the upgrading of the modern seed industry It is suggested to Investigate and collect the biological genetic resources of crops, animal husbandry and aquatic products in southern Tibet, establish nurseries and breeding farms for germplasm resources of local varieties in the region, introduce domestic and foreign fine varieties, enrich the diversity of germplasm resources, establish seed industry innovation centers and extension stations, promote new fine varieties, and promote the crop introduction record system and seed industry production and operation license system in the same suitable ecological area. The southern Tibet should strengthen the cultivation of new varieties of agricultural plants, new varieties of forest and grass plants, new varieties of livestock and poultry, and new varieties of aquatic animals, as well as national invention patents and new utility patents in the field of animal and plant breeding. In addition, it is recommended to cultivate national seed industry enterprises of crops, livestock, poultry and aquatic products, build national regional breeding bases and national seed production counties, implement the action plan for the revitalization of seed industry, strengthen the "chip" of agriculture in southern Tibet, and establish a modern seed industry upgrading project.

5.3 Practicing the idea of "five new developments" to enhance the competitiveness of highland barley and animal husbandry industries with distinctive advantages It is required to adhere to the new development concepts of innovative development, coordinated development, green development, open development and shared development, strengthen the certification of certificates of edible agricultural products, green food and organic food in southern Tibet, integrate regional public goods brands with geographical indications[13-14] (geographical indications products, geographical indications trademarks, geographical indications of agricultural products), and strive to create national famous and excellent products, and enhance the competitiveness of highland barley and animal husbandry industries.

5.4 Establishing modern facility agricultural base to develop vegetable and edible fungus cultivation It is recommended to strengthen land consolidation in southern Tibet, establish high-standard farmland, improve agricultural irrigation systems in the valleys of Shannan and Nyingchi cities, develop facility agriculture, build modern facility agricultural bases, and focus on the cultivation of vegetables and edible fungi.

5.5 Taking advantage of abundant river and lake resources to develop cold-water fish industry The southern Tibeta should investigate the resources and environment of rivers and lakes in Shannan City and Nyingchi City, improve the conditions of aquaculture equipment, make full use of the abundant resources of rivers and lakes, and develop cold-water fish industries such as *S. prenanti*, *S. grahami*, *G. waddelli*, salmon, salmon trout, *M. asiaticus* and *P. hyalocranius*.

5.6 Practicing the Greater Food Approach and building a diversified food supply system in southern Tibet The southern

Tibet should practice the Greater Food Approach, take grain and oil as the main line, build a diversified food supply system in southern Tibet consisting of staple food, miscellaneous grain, edible oil, meat, milk, eggs, honey, aquatic products, fruits, vegetables, edible fungi, *etc.*, further promote the high-quality development of counterpart support to Tibet, and promote food security to diversified food security, to better support and serve the agricultural power and Chinese modernization.

5.7 Making the characteristic and advantageous industries prosper in the rural areas of southern Tibet, and consolidating and expanding the achievements of poverty alleviation

The southern Tibet should make the industries with distinctive advantages prosper and build a new development pattern of the industries with distinctive advantages in rural areas, with the domestic circulation (especially the four provinces providing pairing assistance to southern Tibet) as the main body and the domestic and international circulations promoting each other. It is recommended to learn and apply the experience of the national "Thousand Villages Demonstration and Ten Thousand Villages Renovation" project, promote the construction of "one village, one product" demonstration villages and towns and strong agricultural industry towns in southern Tibet, build national modern agricultural industrial parks and advantageous characteristic industrial clusters, effectively and energetically promote the comprehensive revitalization of rural areas in southern Tibet, consolidate and expand the achievements of poverty alleviation, and ensure that this former national deep poverty area will not return to poverty on a large scale.

5.8 Concentrating on agriculture, forestry, animal husbandry, sideline production and fishery industries in southern Tibet, and simultaneously building an agricultural power

The southern Tibet should concentrate on its agriculture, forestry, animal husbandry and sideline fishery industries, focus on the high-quality development of agriculture, and promote the effective connection between pairing assistance to Tibet and rural revitalization strategies. It is required to adhere to common unity and common prosperity and development, starting from the aspects of basing on the city's agricultural conditions, reflecting the characteristics of Shannan City and Nyingchi City, strong supply security, strong scientific and technological equipment, strong management system, strong industrial resilience, and strong competitiveness, combined with the support of intellectual property rights[15-16], so that southern Tibet and its four pairing assistance provinces can simultaneously build an agricultural power and realize the Chinese-style modernization.

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