

Regional Brand and High-quality Development of Fruits in Ethnic Areas of the Yangtze River Economic Belt under the Greater Food Approach

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Abstract Establishing the Greater Food Approach and promoting the Yangtze River Economic Belt's national major regional development strategy can better support and serve the agricultural power and Chinese-style modernization. This paper introduces the characteristics of fruit industry in 16 autonomous prefectures and 47 autonomous counties under the jurisdiction of the Yangtze River Economic Belt. It studies the intellectual property resources of brand marks from the aspects of geographical indications, collective trademarks, certification trademarks, well-known trademarks in China and national design patents, and analyzes the main problems of brand and high-quality development of fruit industry in these ethnic autonomous areas. Finally, it puts forward some strategies, such as improving the protection of intellectual property rights of geographical indications, using intellectual property rights of brand signs, building modern seed industry upgrading project, drawing lessons from the experience of thousand villages demonstration project, ensuring that large-scale poverty does not occur, and building a diversified food supply system.

Key words Greater Food Approach, Fruit industry, Regional brand, The Yangtze River Economic Belt, Ethnic areas

1 Introduction

On October 12, 2023, the General Secretary Xi Jinping presided over a symposium on further promoting the high-quality development of the Yangtze River Economic Belt, and emphasized that "further promote the high-quality development of the Yangtze River Economic Belt and better support and serve Chinese-style modernization". Promoting the development of the Yangtze River Economic Belt^[1–2] and the coordinated development of the Belt and Road Initiative and the Beijing – Tianjin – Hebei region are the "three major regional development strategies" that the central government is currently focusing on. The economic belt covers 11 provinces and cities, including Shanghai, Jiangsu, Zhejiang, Anhui, Jiangxi, Hubei, Hunan, Chongqing, Sichuan, Guizhou and Yunnan. The major strategy to promote the development of the Yangtze River Economic Belt has established a new development pattern of "one axis, two wings, three poles and multiple points". In the past, the development pattern of "one axis, two wings and three poles" was good, focusing on the major cities and urban circles along the Yangtze River, while the new development pattern of "multiple points" was insufficient. The prosperity of its characteristic and advantageous industries and the coordinated development of ethnic areas (especially 16 autonomous prefectures and 47 autonomous counties under municipal jurisdiction) have not received due attention. With the further development of the Yangtze

River Economic Belt (especially the construction of a new pattern of "multi-point" development), the construction of agricultural power^[3–4] and the promotion of Chinese-style modernization^[5–6], we can not ignore the synchronous development of ethnic autonomous areas, autonomous prefectures, counties and rural areas (especially in industries with distinctive advantages) which account for one third of the total area of the belt.

In the report of the 20th National Congress of the Communist Party of China, it was proposed to "establish a Greater Food Approach", "build a diversified food supply system", and "ensure the security of food, energy resources, and important industrial and supply chains". Compared with the food concept in the past, the Greater Food Approach^[7–9] stresses the diversified food security composed of staple food, coarse grains, edible oil, meat, milk, eggs, honey, silkworm pupae, aquatic products, fruits, vegetables, edible fungi, algae and sugar crops, and emphasizes the need for heat and protein from cultivated land, grasslands, forests and oceans, plants, animals and microorganisms, to develop food resources in an all-round and multi-channel way, emphasizing eating well and eating safely.

In 2023, the No. 1 central document proposed that "based on national conditions and agricultural conditions, it is necessary to reflect Chinese characteristics, and build an agricultural power with strong supply guarantee, strong scientific and technological equipment, strong management system, strong industrial resilience and strong competitiveness". The No. 1 central document in 2024 stated 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". In view of this, based on the

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investigation of ethnic autonomous areas (including 16 autonomous prefectures and 47 municipal autonomous counties, a total of 205 counties), we explored high-quality development of fruit regional brand in ethnic areas of the Yangtze River Economic Belt under the Greater Food Approach.

2 Characteristics of the fruit industry

2.1 Fruit types There are many types of fruits in the ethnic autonomous areas of the Yangtze River Economic Belt. Citrus includes Mandarin, tangerine, orange, tangerine, grapefruit, lemon, *etc.* Drupe fruits include peach, plum, jujube, plum, bayberry, cherry, mango, longan, litchi, avocado, *etc.* The kernel fruits include apple, pear, loquat, hawthorn, *etc.* The berries include grape, strawberry, raspberry, blueberry, persimmon, kiwi fruit, mulberry, dragon fruit, banana, pineapple, pomegranate, passion fruit, *etc.* The melon fruits include watermelon, melon, papaya, papaya, *etc.*

2.2 Seed industry The Ministry of Agriculture and Rural Affairs has identified a total of 190 regional breeding bases and large seed production counties. Among them, the fruit industry in the ethnic autonomous areas of the economic belt has three national regional breeding bases: Xiangxi Prefecture (citrus), Jinghong City (winter breeding) and Xundian Autonomous County (summer breeding). There are no national seed production counties and national seed production enterprises with fruit as the species. The fruit industry in the study area has not obtained the right of new varieties of agricultural plants and new varieties of forest and grass plants. There are 30 types of common fruits in these autonomous prefectures and counties, such as orange, orange, pomelo, lemon, peach, plum, jujube, plum, bayberry, cherry, mango, longan, litchi, apple, pear, loquat, grape, strawberry, raspberry, blueberry, persimmon, kiwifruit, pitaya, banana, pineapple,

pomegranate, watermelon, melon and papaya. In the field of plant breeding (international patent classification A01H), 107 national invention patents and 25 national patents for utility model have been obtained. Among them, Hubei has obtained 10 invention patents and 1 patent for utility model, and Hunan has obtained 6 invention patents and 2 patents for utility model. Chongqing obtained 3 invention patents and 1 patent for utility model, Sichuan obtained 2 invention patents and 3 patents for utility model, and Guizhou obtained 50 invention patents and 1 patent for utility model. Yunnan has obtained 36 invention patents and 17 patents for utility model. However, the ethnic autonomous areas in Zhejiang have not obtained relevant patents.

2.3 Advantageous areas 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 for Chinese characteristic agricultural products in four batches, of which 102 involved fruits. Among them, these autonomous prefectures and counties have four advantageous fruit areas: Yichang orange in Yichang City, Hubei Province, Huili pomegranate in Huili County, Sichuan Province, Majiang blueberry in Majiang County, Guizhou Province, and Binchuan citrus in Binchuan County, Yunnan Province.

2.4 Advantageous counties of national characteristic agricultural products China's *Regional Distribution Plan for Characteristic Agricultural Products (2013 – 2020)* focuses on the development of 144 types of characteristic agricultural products in 10 categories. Among them, there are 14 types of fruits involved in these autonomous prefectures and counties: pomelo, peach, jujube, waxberry, mango, longan, litchi, pineapple, pear, loquat, grape, pomegranate, kiwifruit, banana, papaya, *etc.* (Table 1).

Table 1 Advantageous counties of fruit category national characteristic agricultural products in ethnic autonomous areas of the Yangtze River Belt

Characteristic agricultural products	Advantageous counties
Characteristic pomelo	Xuanen County in Hubei Province
Characteristic peach	Libo and Pingtang counties in Guizhou Province
Characteristic jujube	Hekou County in Yunnan Province
Red bayberry	Shilin, Mengzi, and Shiping counties in Yunnan Province
Mango	Yuanjiang, Jingdong, Jinggu, Shuangjiang, Yongren, Yuanmou, Yuanyang, and Longchuan counties in Yunnan Province
Longan	Yuanjiang County in Yunnan Province
Litchi	Xinping, Yuanjiang, Pingbian, and Yuanyang counties in Yunnan Province
Pineapple	Yuanmou, Pingbian, Hekou, and Jinghong counties in Yunnan Province
Characteristic pear	Lichuan and Xuan'en counties in Hubei Province; Chuxiong, Luxi and Xiangyun counties in Yunnan Province
Loquat	Xichang, Dechang, Ningnan, and Puge counties in Sichuan Province
Grape	Xichang County in Sichuan Province, Yongren, Yuanmou, Wenshan, Qiubei, and Binchuan in Yunnan Province
Kiwifruit	Chengbu, Jishou, Fenghuang, Baojing, and Yongshun counties in Hunan Province; Leishan County in Guizhou Province
Pomegranate	Xichang, Dechang, Huili and Huidong counties in Sichuan Province; Gejiu, Kaiyuan, Mengzi, Jianshui, Shiping, Wenshan, Yanshan and Qiubei counties in Yunnan Province
Banana	Xinping, yuanjiang, Jinggu, Jiangcheng, Menglian, Lancang, Gengma, Gejiu, Pingbian, yuanyang, Honghe, Jinping, Hekou, Malipo, Maguan, Jinghong, Menghai, Mengla, Ruili, Yingjiang and other counties in Yunnan Province
Papaya	Shilin, Mengzi, and Shiping counties in Yunnan Province

2.5 National "one village, one product" demonstration villages and towns

In the autonomous prefectures and autonomous counties of the Yangtze River Economic Belt, there are 73 demonstration villages and towns of "one village, one product" for fruits. Specifically, there are 2 in Hubei Province, involving grape and papaya; 9 in Hunan Province, involving navel orange, Bingtang orange (*Citrus sinensis* Osbeck), citrus, bayberry, pear and kiwifruit; 3 in Chongqing, involving plum and kiwifruit; 14 in Sichuan, involving navel orange, plum, cherry, pear, apple, grape, pomegranate and mulberry; 21 in Guizhou Province, involving navel orange, tangerine, pomelo, plum, pear, apple, loquat, grape, dragon fruit, blueberry and glutinous rice banana, and 24 in Yunnan Province, involving citrus, lemon, peach, jujube, litchi, mango, pear, apple, loquat, grape, ginseng fruit, pomegranate and dragon fruit (*Hylocereus undulatus* Britt). However, there is no national "one village, one product" fruit demonstration villages and towns in the ethnic autonomous areas of Zhejiang Province.

2.6 Strong national agricultural industry towns

Since 2020, the Ministry of Agriculture and Rural Affairs and the Ministry of Finance have jointly launched the construction of a strong national agricultural industry town. There are 80 national agricultural industry towns related to fruits in this study area. Among them, there are 7 in Hubei Province: Jiannan Town of Lichuan City, Huaping Town of Jianshi County, Lijiahe Town of Xuan'en County, Qingping Town of Xianfeng County, Yanzi Town of Hefeng County, Huoshaoping Township of Changyang Autonomous County, and Changleping Town of Wufeng Autonomous County; 6 in Hunan Province: Liye Town in Longshan County, Ludongshan Town in Baojing County, Liaojiaqiao Town in Fenghuang County, Kesha Township and Songbai Town in Yongshun County, Changanying Town in Chengbu Autonomous County; 5 in Chongqing City: Longsha Town, Sanhe Town and Zhongyi Township in Shizhu Autonomous County, Huatian Township and Chetian Township in Youyang Autonomous County; 9 in Sichuan Province: Xialatuo Town in Luhuo County, Zhangguan Town in Huili City, Xiahai Township in Yanyuan County, Songgang Town in Maerkang City, Niduo Town in Seda County, Maisu Town in Dege County, Mian Town in Wenchuan County, Guixi Town in Beichuan Autonomous County, and Laodong Township in Mabian Autonomous County; 25 in Guizhou Province: Bihen Town of Qinglong County, Pinglang Town of Duyun City, Jianzhong Town of Weng'an County, Guandong Town of Congjiang County, Haohuahong Town of Huishui County, Ganxi Township of Shibing County, Yanjia Town of Ceheng County, Censong Town of Jianhe County, Guangshun Town of Changshun County, Zhongcheng Town of Rongjiang County, Wantanhe Town of Longli County, Dewo Town of Xingyi City, Zhaoxing Town of Liping County, Dunzhai Town of Jinping County, Muyin Town of Huangban Town of Songtao Autonomous County, Muhuang Town of Yinjiang Autonomous County, Yayu Township of Yuping Autonomous County, Yuxi Town of Daozhen Autonomous County, Baishiyan Township of Ziyun Autonomous County, Liuma Town and Baishui Town of Zhenning Autonomous County, Xinpu Town of Guanling Autonomous County and Shuanglong Town of Weining Autonomous County; 28 in Yunnan Province: Caiyun Town of Lufeng City, Xizhou Town of Dali City, Xibeile Township of

Mengzi City, Luhe Town of Chuxiong City, Matang Town of Wenshan City, Laowo Town of Lushui City, Shangjiang Township and Xiaozhongdian Town of Shangri-La City, Baxin Town of Shiping County, Guichao Town of Funing County, Xinjie Town of Midu County, Longjie Town of Dayao County and Longpeng Town of Shiping County, Ejia Town of Shuangbai County, Jiayi Town of Yanshan County, Dengchuan Town of Eryuan County, Mengzhe Town of Menghai County, Binju Town of Binchuan County, Qujiang Town of Jianshui County, Niujiaozhai Town of yuanyang County, Yongchun Township of Weixi Autonomous County, Tongdian Town of Lanping Autonomous County, Luxun Township of Yulong Autonomous County, Zhedong Town of Zhenyuan Autonomous County, Xinyingpan Township of Ninglang Autonomous County, Mengyong Town of Gengma Autonomous County, Xijiekou Town of Shilin Autonomous County and Tai'an Township of Yulong Autonomous County. However, there is no strong national agricultural industry town in autonomous prefectures and counties of Zhejiang Province.

2.7 National famous, special and excellent new agricultural products

According to the *List of National Famous and Excellent New Agricultural Products Collection and Registration Information System* issued by the Ministry of Agriculture and Rural Affairs, there are 31 kinds of national famous, special and excellent new agricultural products of fruits in this study area. Specifically, there are 3 kinds of products in Hunan Province: Mayang Bingtang orange, Mayang yellow peach, and Jingzhou waxberry; 7 kinds in Sichuan Province: Wenchuan crisp plum, Maoxian plum, Wenchuan sweet cherry, Xiangcheng apple, Maowen apple, Yanyuan apple, and Xiangcheng blueberry; 12 kinds in Guizhou Province: Luodian navel orange, Qinglong navel orange, Wangmo green lemon, Zhenning honey plum, Qinglong honey plum, Luodian honey plum, Sandu Jiuqian plum, Wangmo mango, Changshun Ziwan grape, Danzhai blueberry, Luodian dragon fruit, Zhenfeng passion fruit (*Passiflora edulis* Sims); 9 kinds in Yunnan Province: Yongren citrus, Guangnan Tangshang Citrus, Yuanmou green jujube, Eryuan plum, Yongren table red cherry, Yuanjiang mango, Menglian avocado, Luxi plateau pear and Xichou kiwifruit. However, in the ethnic autonomous areas of Zhejiang, Hubei and Chongqing, there are no national famous, special and new agricultural products of fruits. Among the 31 kinds of fruits, there are 6 kinds of citrus, 14 kinds of stone fruits, 5 kinds of kernel fruits, 6 kinds of berries, but no melons and fruits.

2.8 "Certification of three products" and national green food raw material standardization production base

In the past, the "three products" certification referred to the certification of pollution-free agricultural products, green food certification, and organic food certification. 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 the China Green Food Development Center, there are 76 valid fruit green food certificates in 10 counties and cities in the ethnic autonomous areas of Hubei Province, and the annual output of green food is 7 206 278 t, involving Ponkan, hybrid Mandarin, navel or-

ange, summer orange, tangerine, pomelo, peach, plum, pear, grape, persimmon, blueberry, kiwi fruit, pomegranate, dragon fruit, orange wine and medlar wine (15% vol). There are 57 corresponding operators, such as Badong County Wanliu Hollow Crisp Plum Professional Cooperative, Enshi Liang'an Agricultural Development Co., Ltd., Changyang Kunhoude Fruit and Vegetable Professional Cooperative, Xuan'en County Shaorong Agricultural Development Co., Ltd., Enshi Prefecture Shimei Liquor Co., Ltd. and Hubei Wolfberry Liquor Co., Ltd. There are four standardized production bases of green food raw materials in China: Badong County in Hubei Province (citrus), Mayang Miao Autonomous County in Hunan Province (Bingtang orange), Yongshun County (kiwifruit) and Huili County in Sichuan Province (pomegranate), but there are no such bases in the ethnic autonomous areas of Zhejiang, Chongqing, Guizhou and Yunnan.

2.9 National modern agricultural industrial parks Since 2017, the Ministry of Agriculture and Rural Affairs and the Ministry of Finance have jointly launched the construction of the national modern agricultural industrial parks, and a total of 299 construction lists have been listed. There are 13 autonomous prefectures and counties related to fruits in the economic belt: Jingzhou Autonomous County and Yongshun County in Hunan Province, Youyang Autonomous County in Chongqing City, Anlong County, Duyun City, Majiang County, Taijiang County and Weining Autonomous County in Guizhou Province, Kaiyuan City, Mangshi City, Heqing County, Xundian County and Yuanmou County Modern Agricultural Industrial Park in Yunnan Province. However, there is no such park in the ethnic autonomous areas of Zhejiang, Hubei and Sichuan provinces.

2.10 National advantageous and characteristic industrial clusters Since 2020, the Ministry of Agriculture and Rural Affairs and the Ministry of Finance have 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 main fruit industrial clusters related to this study area are: Hubei Three Gorges Tangerine Industrial Cluster, Hunan Early and Medium Ripening Citrus Industrial Cluster, Chongqing Crispy Plum Industrial Cluster, Chongqing Lemon Industrial Cluster, Chongqing Three Gorges Citrus Industrial Cluster, and Sichuan Late Ripening Citrus Industrial Cluster.

3 Intellectual property resources of brand marks

Intellectual property resources of fruit brands in ethnic autonomous areas of the Yangtze River Economic Belt include geographical indication products, geographical indication trademarks, geographical indications of agricultural products, ordinary trademarks, collective trademarks, certification trademarks, well-known trademarks in China, provincial famous trademarks, national industrial design patents, *etc.* [10–13].

China currently has the geographical indication product protection system of China National Intellectual Property Administration and the registration system of geographical indication trademarks (geographical indication collective marks and geographical indication certification marks) of the Trademark Office of China

National Intellectual Property Administration^[14–16], but in March 2022, the Ministry of Agriculture and Rural Affairs stopped the registration of geographical indications for agricultural products.

3.1 Geographical indication products There are 21 kinds of fruit geographical indication products in the autonomous prefectures and counties of this economic belt. Among them, Hubei Province has one geographical indication product: Gongshui white pomelo; Hunan Province has three kinds: Luxi Ponkan, Xiangzhu grape, Xiangxi kiwifruit; Sichuan Province has four kinds: Leibo navel orange, Yanyuan apple, Dechang mulberry, Huili pomegranate; Guizhou has 10 kinds: Libo honey pomelo, Sizhou pomelo, Shazi hollow plum, Azang plum, Weining apple, *Longli Rosa roxburghii* Tratt, Longli dried *Rosa roxburghii* Tratt, Majiang blueberry, Luodian pitaya, Guanling pitaya; Yunnan has 6 kinds: Binchuan citrus, Ruili lemon, Eryuan plum, Pingbian litchi, Xiangyun red pear, and Hekou banana. However, there is no fruit geographical indication product in ethnic autonomous areas of Zhejiang and Chongqing.

3.2 Geographical indication trademarks The study area has registered 104 geographical indications trademarks of the fruit industry, including 18 citrus, 27 stone fruits, 21 pome fruits, 34 berries and 4 melons and fruits. Among these geographical indication trademarks, only Mangkang Pineapple is a collective geographical indication trademark, and the other 103 ones are geographical indication certification trademarks. Specifically, Zhejiang has one trademark: Lishui raspberry; Hubei has six trademarks: Badong Ponkan, Changyang Mandarin, Qianping plum, Changle hollow plum, Guankou grape, Ziqu papaya; Hunan has six trademarks: Liye navel orange, Luxi Ponkan, Mayang Mandarin, Jingzhou bayberry, Yaoshan snow pear, Fenghuang red kiwifruit; Chongqing has 4 trademarks: Pengshui plum, Shizhu crisp plum, Pengshui kiwifruit, Pengshui watermelon; Sichuan has 29 trademarks: Muli wrinkled Mandarin, Leibo navel orange, Daocheng lemon, Xide honey peach, Luding Xiantao, Maoxian crisp red plum, Maoxian Qiang crisp plum, Wenchuan sweet cherry, Maoxian sweet cherry, Luding red cherry, Huidong mango, Jinchuan snow pear, Batang apple, Luding apple, Danba apple, Xiangcheng apple, Xiaojin apple, Yanyuan apple (7364042; 23167678), Yuexi apple, Maoxian loquat, Derong grape, Xichang grape (43127145; 61706729), Xiangcheng Bodhi, Mabian kiwifruit, Maoxian kiwifruit, Xiangcheng blueberry, and Dechang mulberry; Guizhou has 11 trademarks: Congjiang Ponkan, Qinglong navel orange, Libo Honey pomelo, Pu'an honey pomelo, Shangguan june plum, Shazi hollow plum, Weining apple, Guiding *Rosa roxburghii* Tratt, Jingu pear, Xingren seedless *Rosa roxburghii* Tratt, and Majiang blueberry; Yunnan has 47 trademarks: Yuanjiang sweet orange, Binchuan Mandarin orange, Xiping Mandarin orange, Yuanjiang kumquat, Dehong lemon, Ruili lemon, Kaiyuan honey peach, Lijiang snow peach, Binchuan winter peach, Yuanmou green jujube, Eryuan plum, Shiping red bayberry (22299436; 43951707), Xiping Litchi, Yuanjiang *Annona squamosa*, Pingbian Litchi, Jingdong mango, Xiping mango, Yuanjiang mango, Weishan red snow pear, Luxi plateau pear, Mengzi loquat, Dake loquat, Longchuan loquat, Binchuan red grape (10292431; 27851056), Deqin grape, Longchuan kiwifruit,

Pingbian kiwifruit, Xichou kiwifruit, Binchuan soft-seed pomegranate, Heijing pomegranate, Jianshui sour pomegranate, Mengzi pomegranate, Xijiekou ginseng fruit, Mangkang pineapple, Xishuangbanna pineapple, Ruili pineapple, Xishuangbanna banana, Yuanyang banana, Hekou banana, Jinping banana, Ruili banana, Menglian avocado, Yuanjiang pitaya, Ruili watermelon, and Ruili *Cucumis melo* L.

3.3 Geographical indications of agricultural products These autonomous prefectures and counties have registered 63 kinds of geographical indications of fruit agricultural products, 12 kinds of citrus, 12 kinds of stone fruits, 14 kinds of kernel fruits, 25 kinds of berries, but no melons and fruits. Among them, Hubei has 6 kinds of products: Qingjiang Ponkan, Yidu Tangerine, Yichang Tangerine, Guankou Grape, Jianshi Kiwifruit, Yichang *Litsea pungens*; Hunan has 7 kinds of products: Xiangxi Ponkan, Yongshun Tangerine, Jingzhou Red Bayberry, Yaoshan Snow Pear, Fenghuang Kiwifruit, Yongshun Kiwifruit, Tongdao Black Tiger [*Kadsura coccinea* (Lem.) A. C. Smith]; Sichuan has 15 kinds of products: Liangshan Leibo Navel Orange, Maoxian Plum, Muli Wrinkled Mandarin, Wenchuan Sweet Cherry, Yuexi Sweet Cherry, Luding Red Cherry, Maowen Apple, Xiaojin Apple, Yuexi Apple, Xiaojin Wine Grape, Xichang Grape, Dechang Strawberry, Jiuzhaigou Persimmon, Shiqu *Solanum muricatum*, Dengke Wolfberry; Guizhou has 24 kinds of products: Qinglong Navel Orange, Luodian Navel Orange, Huangguoshu Huangguo, Maoping Tangerine, Huishui Jinqian Tangerine, Zhenfeng April Plum, Zhenning Honey Plum, Ziyun Ice Crisp Plum, Guiding Panjiang Crisp Plum, Zhenning Cherry, Wangmo Mango, Weining Yellow Pear, Fuquan Pear, Longli *Rosa roxburghii* Tratt, Anshun Golden *Rosa roxburghii* Tratt, Weining Apple, Kaili Crystal Grape, Guanling Dragon Fruit, Ceheng Glutinous Rice Banana, Lurong Passion Fruit, Pingtang Passion Fruit; Yunnan has 11 kinds of products: Kaiyuan Peach, Shiping Red Bayberry, Wenshan Tapi Pear, Luxi Plateau Pear, Weishan Red Snow Pear, Maidiwan Pear, Maitreya Grape, Shilin Sweet Persimmon, Jianshui Sour Pomegranate, Mengzi Pomegranate and Shilin *Solanum muricatum*. However, there is no registration of geographical indication of agricultural products in ethnic autonomous areas of Zhejiang and Chongqing.

3.4 Standards for geographical indications Fruits in the ethnic autonomous areas of the Yangtze River Economic Belt have no national standards for geographical indications. There are 23 local standards for geographical indications: *Geographical Indication Product Luxi Ponkan*, *Geographical Indication Product Zhenning Cherry*, *Geographical Indication Product Zhenning Honey Plum*, *Geographical Indication Product Pingbian Litchi*, *Geographical Indication Product Hekou Banana*, etc.

3.5 Demonstration zones for the protection of national geographical indications products and special geographical indications There is no demonstration area for the protection of national geographical indication products of fruits in the autonomous prefectures and counties of the economic belt. The number of market entities using special geographical indications of Luxi Ponkan, Zhenning Cherry, Zhenning Honey Plum, Pingbian Litchi and Hekou Banana is only 3, 0, 0, 4 and 1, respectively.

3.6 Chinese geographical indications protected in the European Union There are only three kinds of fruits of geographical indications in these autonomous prefectures and counties protected by the European Union: Yichang Orange, Xiaojin Apple and Majiang Blueberry.

3.7 Collective trademarks and certification trademarks Apart from Mangkang Pineapple as a collective trademark of geographical indications, there are more than 50 collective trademarks of fruit industry in these ethnic autonomous areas, such as Lishui Shangeng, Xiangjia Orchard, Kekeqiao, Jiguo Dishu, Maowei, Meigumei, etc. In addition to the 103 geographical indications certification trademarks mentioned above, there are two certification trademarks, Haitang and Huili.

3.8 Famous trademarks of China There are only 15 famous trademarks of China in the fruit industry (including fruit wine) of autonomous prefectures and counties in the economic belt: Tianyan, Meijinyuan, Mayang, Shengou Jiuzhaihong, Huili, Yanyuan Apple, Heyuan, Yunnanhong, Heqinggan, Ouya, Erbao, Jinliufu (1359553; 3127519), Shangri-La, and Taiyanghun.

3.9 National industrial design patents The national industrial design patents related to the fruit industry mainly belong to the 9th packaging and container of the international classification (Locarno Classification, LOC). Its Locarno numbers include 09-01, 09-02, 09-03, 09-04, 09-05, 09-06, 09-07, 09-08, and 09-99. The above 30 common fruits in the study area have obtained a total of 628 national industrial design patents for packaging and containers, including 2 in Zhejiang, 10 in Hubei, 4 in Hunan, 5 in Chongqing, 95 in Sichuan, 222 in Guizhou and 290 in Yunnan.

4 Problems in branding and high-quality development

4.1 Weak food security awareness The certification of edible agricultural products, which replaces the certification of pollution-free agricultural products, has not yet attracted sufficient attention. There are few green food certifications, fewer organic food certifications, fewer "three products" certifications, few standardized production bases of green food raw materials in China, and food security awareness of fruits and their processed products needs to be strengthened.

4.2 Imperfect protection of intellectual property rights of geographical indications Many famous and excellent fruits have not implemented the protection of intellectual property rights of geographical indications. Since the Ministry of Agriculture and Rural Affairs stopped the registration of geographical indications of agricultural products by in March 2022, many geographical indications of agricultural products are facing the implementation of the geographical indication product protection of China National Intellectual Property Administration, or the registration of geographical indication collective trademarks or geographical indication certification marks with the Trademark Office of the China National Intellectual Property Administration. The collection and collation of natural and human factors of geographical indications are not enough. There are no national standards for geographical indications, only 23 local standards for geographical indications, few special geographical indications, and few geographical indications

knowledge and geographical indications trademarks. There is no legal market entity for the use of special geographical indications, no national demonstration zone for the protection of geographical indications products has been established, the external exchange of geographical indications is insufficient, only three kinds of fruits are protected by geographical indications in the EU, and the protection of intellectual property rights of geographical indications is imperfect.

4.3 Insufficient protection of the whole chain of intellectual property rights of brand marks In addition to the insufficient protection of geographical indications, there are few relevant collective trademarks and certification trademarks, few public trademarks, few famous trademarks in China and famous trademarks in the province, and few national industrial design patents. Especially in the ethnic autonomous areas of Zhejiang, Hubei, Hunan and Chongqing, there are fewer famous, special and new agricultural products in China, and the protection of the whole chain of intellectual property rights creation, application, protection, management and service of brand marks is insufficient.

4.4 Development of seed industry lagging behind Although fruit biological genetic resources are abundant, there are only three related national regional breeding bases. There are no state-level seed production counties and national seed industry enterprises, and no rights to new varieties of fruit agricultural plants and new varieties of forest and grass plants. In the field of plant breeding (international patent classification A01H), few common fruits have won national invention patents and national patents for utility model, especially in the ethnic autonomous areas of Zhejiang, Hubei, Hunan, Chongqing and Sichuan, where the development of fruit seed industry lags behind.

4.5 Not deep demonstration projects The construction of advantageous areas of agricultural products with Chinese characteristics and advantageous counties of agricultural products with national characteristics needs to be strengthened, the construction of national "one village, one product" demonstration villages and towns and strong towns of national agricultural industry needs to be deepened, the construction of national modern agricultural industrial parks and national advantageous and characteristic industrial clusters needs to be comprehensive, and the demonstration projects of fruit industry need not be deepened.

4.6 Less deep processing of products The vast majority of fruits are only primary agricultural products-fresh fruits, and there are few dried fruits, fruit juice, fruit wine, health products and nutrients, and the deep processing of products is not enough, which is not favorable for the preservation of fruit foods.

5 Recommendations for branding and high-quality development

5.1 Promoting the certification of "three products" and develop green industry It is necessary to adhere to the concept of green development, enhance the awareness of food security in the fruit industry, promote the certification of edible agricultural products, green food and organic food, establish a national standardized production base for green food raw materials, and develop the

green fruit industry in the Yangtze River Economic Belt.

5.2 Improving the protection of intellectual property rights of geographical indications and building regional public brands It is recommended to investigate the resources of famous and high-quality fruits, analyze the natural and human factors of their geographical indications, and implement the intellectual property protection of geographical indications. Besides, it is necessary to promote the implementation of geographical indications of agricultural products and the protection of geographical indications products of China National Intellectual Property Administration or register a geographical indication collective trademark or a geographical indication certification trademark with the Trademark Office of China National Intellectual Property Administration to complete the transfer of its geographical indication intellectual property protection system. In addition, it is recommended to establish national and local standards for geographical indications, encourage relevant market participants to use special geographical indications for geographical indications products and trademarks, integrate public goods brands with geographical indications, establish national demonstration zones for the protection of geographical indications products, strengthen foreign exchanges of geographical indications, implement brand marketing projects, and promote geographical indications, and build the regional public brands for fruit products of the Yangtze River Economic Belt.

5.3 Using the intellectual property rights of brand marks to improve the development level of rural industry In addition to the protection of geographical indications, it is also necessary to strengthen the registration of relevant collective trademarks and certification trademarks, make effort to create provincial famous trademarks and famous trademarks in China, strengthen the creation and application of national industrial design patents, and strive to create national famous, special and new agricultural products, enhance the whole chain protection of the creation, application, protection, management and service of intellectual property rights of brand labels, excavate the cultural connotation of products, promote the branding development of fruit industry, enhance its management system, and promote the development level of rural fruit industry in the Yangtze River Economic Belt.

5.4 Promoting the action plan for the revitalization of seed industry and building a modern seed industry upgrading project We should protect local fruit plant genetic resources, introduce domestic and foreign fine varieties, maintain the diversity of seed industry biological genetic resources, establish seed industry innovation centers and extension stations, promote new fine varieties, promote the crop introduction record system and seed industry production and operation license system in the same suitable ecological area, and promote the seed industry revitalization action plan. In addition, it is required to strengthen the creation of new varieties of agricultural plants and new varieties of forest and grass plants for fruits, create national invention patents and national utility model patents in the field of fruit breeding (international patent classification A01H), cultivate national fruit and crop seed industry enterprises, build national regional breeding bases and national seed production counties, and promote the cultivation of new varieties, and build the modern seed industry upgrading project in the Yangtze

River Economic Belt and strengthen the agricultural "chip".

5.5 Promoting the construction of "one village, one product" demonstration villages and towns and strong agricultural industry towns with reference to the experience of the thousand villages demonstration project It is recommended to promote the construction of "one village, one product" demonstration villages and towns in the Yangtze River Economic Belt with fruit as the leading product and strong agricultural industry towns, and build strong fruit villages and towns with reference to the experience of the thousand villages demonstration project, based on the fruit industry, and in accordance with agricultural environment and resources.

5.6 Building characteristic agricultural product advantage areas, and constructing national modern agricultural industrial parks and advantageous characteristic industrial clusters

It is recommended to promote the construction of advantageous counties with national characteristics such as pomelo, peach, jujube, bayberry, mango, longan, litchi, pineapple, pear, loquat, grape, pomegranate, kiwifruit, banana and papaya, and build national and provincial advantageous areas for characteristic agricultural products. In addition, we should use modern agricultural technology and industrial management system to build a national modern agricultural industrial park, strengthen industrial integration and the development of the whole industrial chain, as well as the gathering of relevant universities, scientific research institutions, standard-setting institutions and industrial associations, so as to build national advantageous characteristic industrial clusters.

5.7 Prospering fruit and other industries with special advantages to ensure no large-scale poverty return It is necessary to promote the effective connection between the major development strategy of the Yangtze River Economic Belt and the rural revitalization strategy, adhere to the new development concepts such as innovative development, coordinated development, green development, open development and shared development, and prosper characteristic and advantageous fruit industries. Also, it is recommended to construct a new development pattern with the domestic (especially the Yangtze River Economic Belt) cycle as the main body and the domestic and international dual cycles reinforcing each other, effectively promote the comprehensive revitalization of rural areas, consolidate and expand the achievements of poverty alleviation, and ensure that there is no large-scale return to poverty, especially in the former contiguous poverty, as well as the former national-level deep poverty-stricken areas such as Sichuan Tibetan area, Liangshan Prefecture, Yunnan Tibetan area, and Nujiang Prefecture.

5.8 Establishing a diversified food supply system to ensure national food security It is recommended to improve the preservation technology and storage equipment of fresh fruits, strengthen the processing of dried fruits, fruit juice, fruit wine, health products and nutrients, and produce diversified fruit foods that are easier to preserve. Taking grain and oil as the main line and fruit as the demonstration, the Yangtze River Economic Belt should build a diversified food supply system consisting of staple food, miscellaneous grain, edible oil, meat, milk, eggs, honey, silkworm chrys-

alis, aquatic products, fruits, vegetables, edible fungi, algae and sugar to further promote the high-quality development of the economic belt. Finally, we should establish the Greater Food Approach, upgrade food security to diversified food security, ensure national food security, so as to better support and serve agricultural power and Chinese-style modernization.

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