

GIES Case Dataset on Yangxian Black Rice Crested Ibis (*Nipponia nippon*) Habitat in Caoba Village, Shaanxi Province of China

Wang, Y. S.^{1*} Yang, Y. Y.¹ Liu, Y. S.¹ Zhang, X. R.² Du, L. M.³ Xiao, X. D.³
Liu, K. C.⁴ Bai, Y.²

1. Institute of Geographic Sciences and Natural Resources Research, Chines Academy of Sciences, Beijing 100101, China;
2. School of Earth Science and Resources, Chang'an University, Xi'an 710054, China;
3. Organic Industry Development Office of Yang County, Shaanxi, Yang County 723300, China;
4. Zhuhuanhu Fruit Industry Professional Cooperative of Yang County, Caoba Village, Yang County, Shaanxi, Yang County 723399, China

Abstract: Yang county is the only wild population habitat and artificial breeding provenance of the world's rare bird, *Nipponia nippon*. It is known as the "Hometown of *Nipponia nippon*" and has unique and unparalleled advantages for the development of modern organic agriculture. In recent years, Yang county has made full use of the regional ecological resources, adhering to the "ecology theory", realizing that lucid waters and lush mountains are invaluable assets and act on this understanding. It has made its trinity harmonious development way to the organic industry, eco-tourism, and targeted poverty alleviation, forming a typical regional model that organic agriculture promotes targeted poverty alleviation and rural revitalization. This dataset shows the geographical scope and environment of organic black rice in Yang county and Caoba village, its core main producing area; the physical geographic data of Caoba village, including DEM classification, water quality, soil physical and chemical properties, NDVI and land use; black rice varieties and their characteristics; data related to the operation and management of planting cooperatives; data on the protection of *Nipponia nippon*; photos of rice fields, *Nipponia nippon* and black rice products. It is archived in .shp, .tif, .xlsx, .txt and .jpg formats and consisted of 76 data files with a data size of 42.6 MB.

Keywords: geographic indications; black rice; Yang county; Caoba village; *Nipponia nippon* Habitat; Case 5

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***Corresponding Author:** Wang, Y. S., Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, wangys@igsnr.ac.cn

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Dataset Availability Statement:

The dataset supporting this paper was published and is accessible through the *Digital Journal of Global Change Repository* at: <https://doi.org/10.3974/geodb.2021.08.06.V1> or <https://cstr.escience.org.cn/CSTR:20146.11.2021.08.06.V1>.

1 Introduction

Yang county, the home to crested ibis, is located in the Hanjiang river region, Shaanxi province. It is an important water conservation area of the middle route of China's South-to-North Water Diversion Project and Shaanxi province's Hanjiang-to-Weihe river water diversion project^[1], and has unique advantages for the development of organic agriculture^[2,3]. In recent years, Yang county has made full use of this ecological resources transforms the lucid waters and lush mountains into invaluable assets. It has made its trinity harmonious development way by using organic industry and eco-tourism to promote targeted poverty alleviation and rural revitalization. In 2006, Yangxian black rice was designated as a national geographical indication product^[4].

The crested ibis (*Nipponia nippon*), is an animal of the genus crested ibis of the ibis family, and is an endemic specie to East Asia. The crested ibis lives in temperate mountain forests and hilly areas, mostly adjacent to wetland environments such as rice fields, river beaches, ponds, streams and swamps, strolling foraging for small fish, crabs, frogs, snails and other aquatic animals, and eating insects^[5]. The crested ibis is medium in size, with



Figure 1 Crested ibis (by Zhang, J. S.)

white feathers, and a long willow-shaped feather crown on the back occiput. The skin from the forehead to the cheek is bare and bright red (Figure 1). The crested ibis was once widely distributed in eastern China, Japan, Russia, North Korea and other places. However, due to environmental degradation, the population declined sharply. In the 1980s, the global survived 7 wild crested ibis were found at the southern foot of the Qinling Mountains in Yang county, Shaanxi province, China^[5].

The protection of crested ibis has started in China since its rediscovery in Yang county in 1981. In May 2021, the news released from the 40th Anniversary of the Rediscovery of Crested ibis in Hanzhong city showed that the number of crested ibis in the world has increased from 7 in 1981 to over 7,000 in 2021. It is noted that more than 5,000 Crested ibis were in Shaanxi province alone, and more than 3,000 Crested ibis were in Hanzhong city.

Specific protection measures of crested ibis in China were listed in Table 1. Crested ibis protection is also highly valued internationally. Crested Ibis is regarded as a holy bird by the Japanese royal family and an international protected bird. Specially designated wildlife reserves and protection centers have been established. After the crested ibises was found, Crested ibis has been added to the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, Globally-important Agricultural Heritage Systems (GIAHS) and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). China has also successively organized international seminars and forums on the protection of Crested Ibis (Table 2). This dataset^[6] includes the physical geographical data, organic black rice variety characteristics and management data, crested ibis protection data of Caoba village, the core production area of black rice in Yang county. It can be used to analyze the production environment of black rice in Yang county and study the large-scale, market-oriented and sustainable development of organic black rice in Yang county.

Table 1 Crested ibis conservation activities in China

Year	Conservation activities
1981	Crested ibis was rediscovered. Forestry Bureau of Yang county in Shaanxi province established the “Four-person Protection Group for Qinling I Crested Ibis Colony”
1981	Yang county issued the “Regulations on prohibiting the use of pesticides and fertilizers in the crested ibis activity area”
1983	Government of Yang county approved the establishment of “Yang County Crested Ibis Protection Observation Station”
1986	Shaanxi province approved the establishment of “Shaanxi Crested Ibis Protection Observation Station”
1991	The wildlife protection law of the People’s Republic of China came into force
2001	The name was changed to “Shaanxi Crested Ibis Nature Reserve”
2002	The second crested ibis breeding farm was established in the Shaanxi Rare Wild Animal Rescue and Breeding Center in the north of the Qinling Mountains
2005	China’s State Council approved to establish “Shaanxi Hanzhong Crested Ibis National Nature Reserve”
2006	The “Regulations on wetland protection of Shaanxi province” was issued
2007	The “Regulations on ecological environment protection in Qinling Mountains of Shaanxi province” was issued
2010	“Regulations on the protection of wild animals in Shaanxi province” was issued
2019	People’s Congress of Shaanxi province amended the “Regulations on ecological protection in Qinling Mountains of Shaanxi province”
2019	“List of national key protected wild animals distributed in Shaanxi province” was released
2019	“Qinling ecological protection action plan” was released
2020	Report on the conservation achievements of the crested ibis in Shaanxi province was released

Table 2 International protection measures of crested ibis

Year	Nation	Protection measures
1922	Japan	The Ornithological Society of Japan unified the Latin name of the ibis as <i>Nipponia nippon</i>
1945	Japan	The main habitat of crested ibises (Sado Island) was determined as a wildlife reserve
1960	Japan	Crested Ibis was added to internationally protected bird list on the 12 th International Union for the Conservation of Birds
1967	Japan	Japanese Crested Ibis Protection Center was established in Sado Island, Niigata
1985	China & Japan	China-Japan Joint Protection of Crested Ibis Plan was signed
2001	International	Crested ibis was added to IUCN Red List of Threatened Species
2011	China	Crested Ibis Protection International Symposium on three decades was held
2011	Japan	Japan introduced crested ibises from China in batches for breeding. Sado’s Satoyama in harmony with Japanese crested ibis, Japan was added to GIAHS by FAO
2018	China	Crested Ibis International Forum was held
2019	International	Crested Ibis was added to CITES
2019	South Korea	China, Japan and South Korea signed a memorandum of cooperation for crested ibis on the 2 nd Crested Ibis International Forum

2 Metadata of the Dataset

The metadata of the Dataset of GI environment protection and sustainable development of black rice and crested ibis (*Nipponia nippon*) habitat in Caoba village, Yang county, Shaanxi province of China^[6] are summarized in Table 3.

3 Data Pre-processing

This dataset includes physical geographical data, rice variety characteristics data, operation and management data, and crested ibis protection data. The last three categories were mainly collected from Organic Industry Development Office of Yang county, relevant network and literature data. Therefore, the source and processing of physical geographic data was as follows. The technical route was shown in Figure 2.

① Digital elevation model (DEM) grading data was obtained from Aster GDEM v2¹ and

¹ Aster gdem v2. <https://search.earthdata.nasa.gov/search?q=ASTER>.

then graded, with a spatial resolution of 30 m.

Table 3 Metadata summary of Dataset of GI environment protection and sustainable development of black rice and crested ibis (*Nipponia nippon*) habitat in Caoba village, Yang county, Shaanxi province of China

Item	Description
Dataset name	Dataset of GI environment protection and sustainable development of black rice and crested ibis (<i>Nipponia nippon</i>) habitat in Caoba village, Yang county, Shaanxi province of China
short name	YangCountyBlackRiceCase05
Authors	Wang, Y. S., Institute of Geographic Sciences and Natural Resources Research, CAS, wangys@igsnrr.ac.cn Yang, Y. Y., Institute of Geographic Sciences and Natural Resources Research, CAS, yangyy@igsnrr.ac.cn Liu, Y. S., Institute of Geographic Sciences and Natural Resources Research, CAS, liuys@igsnrr.ac.cn Zhang, X. R., School of Earth Science and Resources, Chang'an University, 1476008529@qq.com Du, L. M., Organic Industry Development Office of Yang County, 1285122262@qq.com Xiao, X. D., Organic Industry Development Office of Yang County Liu, K. C., Zhuhuanhu Fruit Industry Professional Cooperative of Yang County Bai, Y., School of Earth Science and Resources, Chang'an University, baiyu0116@163.com Caoba village, Yang county, Hanzhong, Shaanxi province of China
Geographical region	
Year	2000–2020
Data format	.shp, .tif, .docx, .xlsx, .pdf, .txt, .jpg
Data size	42.6 MB
Data files	7 data folders and 76 data files
Foundation	National Natural Science Foundation of China (41931293)
Data publisher	Global Change Research Data Publishing & Repository, http://www.geodoi.ac.cn
Address	No. 11A, Datun Road, Chaoyang District, Beijing 100101, China
Data sharing policy	Data from the Global Change Research Data Publishing & Repository includes metadata, datasets (in the <i>Digital Journal of Global Change Data Repository</i>), and publications (in the <i>Journal of Global Change Data & Discovery</i>). Data sharing policy includes: (1) Data are openly available and can be free downloaded via the Internet; (2) End users are encouraged to use Data subject to citation; (3) Users, who are by definition also value-added service providers, are welcome to redistribute Data subject to written permission from the GCdataPR Editorial Office and the issuance of a Data redistribution license; and (4) If Data are used to compile new datasets, the ‘ten per cent principal’ should be followed such that Data records utilized should not surpass 10% of the new dataset contents, while sources should be clearly noted in suitable places in the new dataset ^[7]
Communication and searchable system	DOI, CSTR, Crossref, DCI, CSCD, CNKI, SciEngine, WDS/ISC, GEOSS

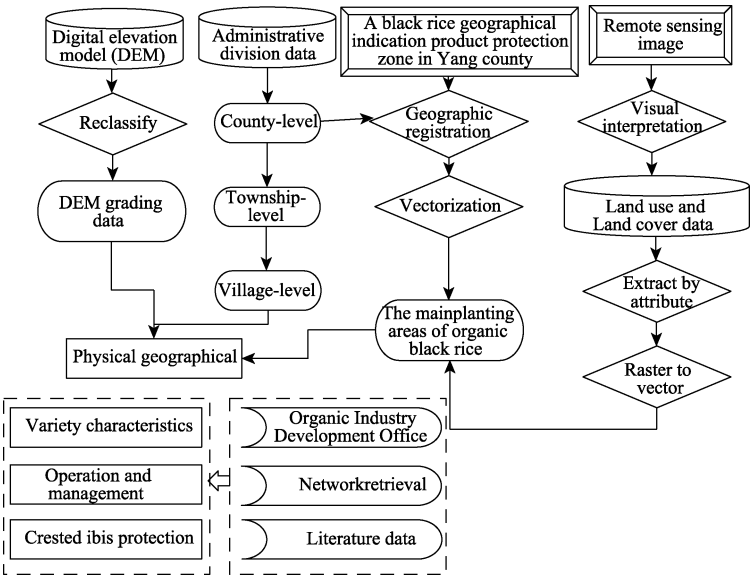


Figure 2 The technical route of dataset processing

- ② Administrative boundary data, including county-, township-, and village-level, were provided by Natural Resources Bureau of Yang county.
- ③ The planting areas of organic black rice was obtained by extracting the paddy field based on the secondary category (code 11) of Land use data in 2015, and then extracting black rice geographical indication product protection zone in Yang county based on Shaanxi province local standard “Product of geographical indication—Yang county black rice”.
- ④ Land use data in Caoba village was obtained through visual interpretation based on European Space Agency (ESA) Sentinel-2 data² on May 18 and August 26, 2020, with a spatial resolution of 10 m.

4 Dataset Composition

4.1 Physical Geographical Data

4.1.1 Location and General Information

Yang County (107°11'E–108°33'E, 33°02'N–33°43'N) is famous as the “Home to Crested Ibis”. It is located at the southern of the Qinling Mountains and the eastern edge of the Hanzhong basin. Yang county borders Foping county on the east, Xixiang county on the south, Chenggu county on the west, and Taibai county and Liuba county on the north (Figure 3). According to data from the China County Statistical Yearbook in 2019, Yang county had a population of 446,300, with 3 subdistrict offices, 15 towns, 271 administrative villages, and 14 community neighborhood committees². The terrain of Yang county is higher in the north and lower in the south, with the highest elevation of 3,022 m in the northeast and the lowest elevation of 396 m in the southwest (Figure 4). It can be divided into Qinling middle mountain, Qinba low mountain, Qinba hilly area and Hanjiang Pingba district^[1]. From 2000 to 2018, the annual precipitation was 907.09 mm, and the average annual temperature was 12.3 °C.

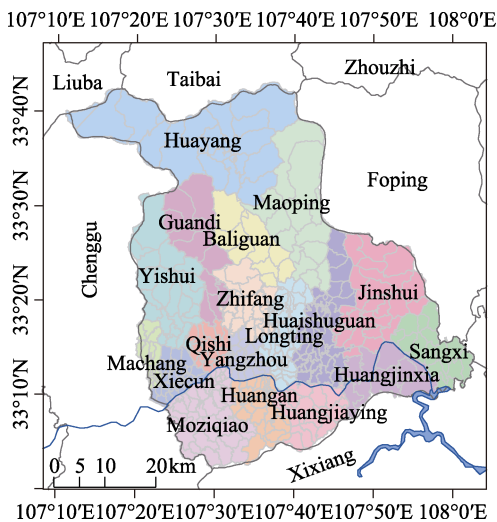


Figure 3 Location of Yang county

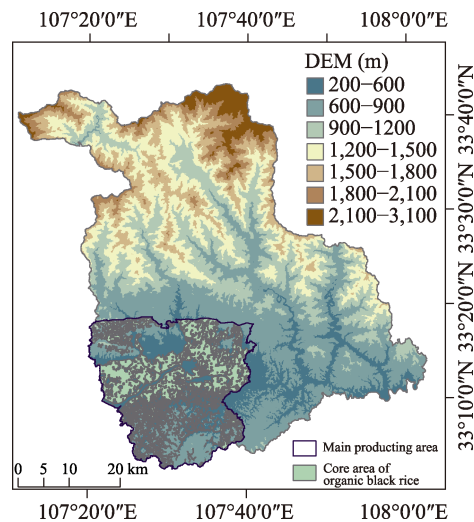


Figure 4 Digital elevation model of Yang county

4.1.2 Case Study Area: Caoba Village

(1) Land use

Caoba village is located in Zhifang street (township) in the north of Yang county. It lies in the core of the crested ibis protection area. Caoba village is the first station where the crested

² Natural Resources Bureau of Yang county.

ibis settled from a high-altitude to a low-altitude area. The average annual precipitation in Caoba was 785 mm between 2000 and 2019, and the average annual temperature was 14.4 °C between 2014 and 2019³. In 2020, the main land use of the village is paddy field with areas of 2.44 km², accounting for 79.20% of the total area of the village. The rural residential areas and grassland had an area of 0.38 and 0.23 km², accounting for 12.44 % and 7.52%, respectively (Figure 5). The per capita annual income in Caoba village was 20,000 Yuan in 2020.

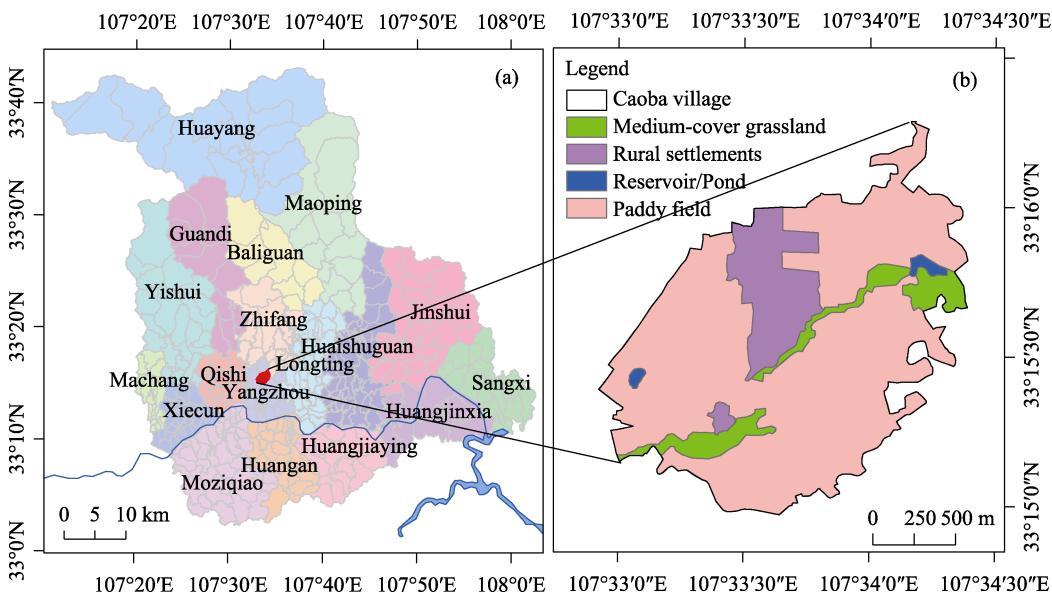


Figure 5 Location (a) and land use (b) of Caoba village

(2) Soil quality

Five black rice planting areas were randomly selected to collect soil samples in Caoba village (Figure 6). The average contents of total nitrogen (TN), total phosphorus (TP), available phosphorus (AP), available potassium (AK), organic matter (OM) and pH of the soil were 1.69 g/kg, 0.68 g/kg, 16.32 mg/kg, 161.76 mg/kg, 2.59% and 7.21, respectively (Table 4). After rice transplanting, crested ibis foraged in the paddy field (Figure 7).

Table 4 Soil nutrients of black rice paddy field in Caoba

Number	TN (g/kg)	TP (g/kg)	AP (mg/kg)	AK (mg/kg)	OM (%)	pH
Sample 1	1.41	0.67	18.84	128.55	2.14	7.17
Sample 2	2.03	0.69	16.43	168.75	3.24	7.25
Sample 3	1.18	0.65	19.15	98.45	1.72	7.32
Sample 4	1.81	0.70	13.00	170.60	2.39	7.25
Sample 5	2.04	0.70	14.20	242.45	3.48	7.05
Mean	1.69±0.17	0.68±0.01	16.32±1.22	161.76±24.24	2.59±0.33	7.21±0.05

(3) Water quality

Seven water samples were selected to analyze irrigation water quality in the up- and middle-stream as well as the entrance to the paddy field (Figure 3). The contents of Cadmium (Cd), Arsenic (As), Lead (Pb) and Chromium (Cr) in the irrigation water all met

³ Data Sources: <http://data.cma.cn/>.

the Standard for Irrigation Water Quality (GB 2084—2005) (Table 5).

4.2 Black Rice Variety Characteristics

Black rice in Yang county is oblong in appearance with the gray-brown color of rice husk. It was served as a tribute to the imperial court due to its unique characteristics and flavor (Figure 8). According to the local standard of Shaanxi province “Geographical indication product Yang county black rice (DB61/T 1011—2018)”^[9], the sensory requirements of Yang county black rice are blackness $\geq 85.0\%$, whole black rice rate $\geq 96\%$. The physical and chemical indicators requirements are black rice pigment (E) ≥ 1.5 , crude protein $\geq 9.0\%$, alkali elimination value ≥ 6.0 , fat $\geq 2.0\%$, Lysine $\geq 0.30\%$, and Vitamin B2 ≥ 0.05 mg/100g. It was determined that the nutritional components of Crested Ibis Lake Brand organic black rice in Caoba village contained 89% blackness, 96.5% whole black rice rate. The black rice pigment (E), crude protein, alkali elimination value, fat, Lysine, and Vitamin B2, were 2.0, 9.32%, 6.2, 2.5%, 1.17%, and 0.058,1 mg/100g, respectively (Table 6).

4.3 Business and Management

4.3.1 Social and Economic Infrastructure

Founded in 2009, the Fruit Industry Professional Cooperative of Caoba village Crested Ibis

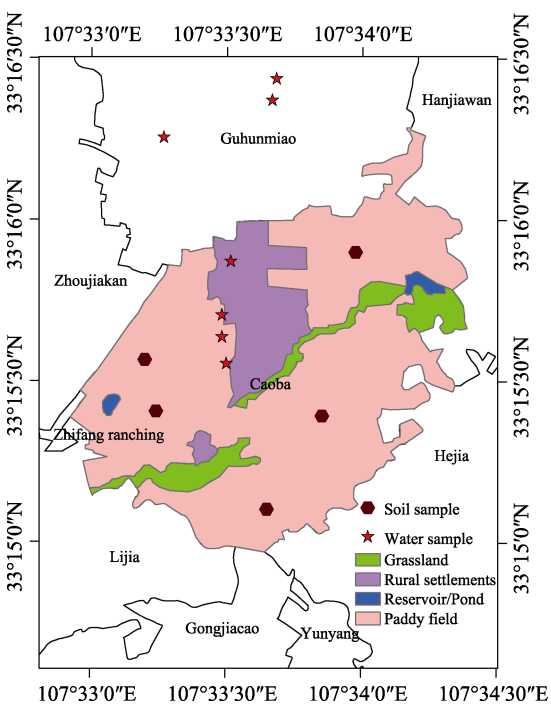


Figure 6 Sampling site of water and soil



Figure 7 Crested Ibis foraging in black rice paddy field of Caoba village

Table 5 Irrigation water quality of black rice paddy field in Caoba village

Number	Cd (μg/L)	As (μg/L)	Pb (μg/L)	Cr (μg/L)
Sample 1	0.093	0	0.591	0.182
Sample 2	0.075	0	2.677	0.299
Sample 3	0.093	0	0	0.089
Sample 4	0.105	0	0	0.166
Sample 5	0.136	0	1.919	0.385
Sample 6	0	0.222	0	0.120
Sample 7	0	0	0	0.069



(1) Black rice panicle



(2) Black rice grain

Figure 8 Sensory characteristics of black rice
Table 6 Main nutrients of organic black rice in Caoba village

Item	Test result	Standard ^[9]
Blackness	89%	≥85.0%
Whole black rice rate	96.5%	≥96%
Black rice pigment (E)	2.0	≥1.5
crude protein	9.32%	≥9.0%
alkali elimination value	6.2	≥6.0
Fat	2.5%	≥2.0%
Lysine	1.17%	≥0.30%
Vitamin B2	0.0581 mg/100g	≥0.05 mg/100g

Lake has fixed assets of 102 million Yuan and revenue of 56 million Yuan. Follow a series of strict organic product standards, 35 kinds of agricultural products in 7 categories have obtained the organic certification from the National Certification and Accreditation Administration (CNCA), and organic rice products have also been certified by the European Union. Based on the ecological advantages, 403 ha of organic rice and rape base have been established according to the technical standards of organic agricultural production, the processing, storage and marketing system of agricultural products has also been completed. The main 13 categories of products have obtained the national organic certification, including black rice, red rice, fragrant rice, black rice wine, black rice vinegar, black rice flour, black rice tea, golden pear, rapeseed oil, sesame oil, lozenge, fruit and vegetable chips, and pear juice. The organic planting base has been monitored under video surveillance throughout the whole process; products quality is tested at laboratory in batches; storage, storage fresh-keeping boxes and product circulation can be traced back through QR code. The one-stop management of planting, processing and delivery ensures the quality of organic agricultural products. The Crested Ibis Lake trademark has won honors, including the “Famous Trademark of Shaanxi province”, the honor of “National Demonstration Society”, and “National Top Ten Organic Planting Technology Demonstration Base” (Table 7).

4.3.2 Black Rice Planting Management

The main environmental conditions, management measures and standards of black rice in Yang county are as follows (Figure 9).

(1) Soil types: mainly rust-spotted mud sand soil and rust-spotted soil, with sufficient irrigation water. (2) Rice varieties: Qindao-2 and Qindao-1, and the quality of seeds should meet the requirements of GB 4404.1. (3) Planting: the sowing time of late-maturing varieties should be from April 2 to 10, and the mid-early-maturing varieties should be sown from April 10 to 15. The sowing amount is about 375 kg/ha, and the seedling age is 30 days.

Table 7 The Fruit Industry Professional Cooperative of Caoba village Crested Ibis Lake

Brand name	Business unit	Company overview	Production mode	Marketing activities
Crested Ibis Rice	The fruit industry professional cooperative of Crested Ibis Lake in Yang county	Founded in 2009, the Fruit Industry Professional Cooperative of Crested Ibis Lake has a fixed assets of 102 million Yuan with an annual income of 56 million Yuan; 320 ha of demonstration garden for organic red rice, black rice, fragrant rice, and rapeseed; with an annual output of 700 tons of organic rice	Company + Cooperative + Base + Farmer	Strengthen the cooperation with the Shaanxi Supply and Marketing Cooperative, Tmall, JD.com and other platforms, and directly sell organic products to more than 20 cities including Beijing, Shanghai, and Guangzhou



Figure 9 Main stages of black rice cultivation and management

When the black rice seedlings have 3–4 tillers, they should be transplanted. The transplanting time should be from May 15th to June 5th, according to the width of 30 and 16 cm, and planting in 37.5 thousand holes per hectare, with 2–4 seedlings per hole. (4) Fertilization and irrigation: farm manure only, more than 15,000 kg/ha. After transplanting, the water is irrigated frequently with shallow water, and the water is withdrawn around June 25 to dry the field. The shallow water is maintained from booting stage to filling stage, and the water is cut off at the end of wax ripening. (5) Weed and pest management: artificial weeding and physical pest control. (6) Harvest: The blank rice could be harvested when the color of glumes changes from black to grayish brown, and the rice grains became hard, usually in early or mid-September.

4.4 Historical Culture of Black Rice in Yang County

Black rice has been planted in Yang county since 3,000 years ago, this claim has been supported by many historical documents, including “Book of Songs, Daya, Shengmin” (Spring and Autumn Period), “Biography of Mao”, Luo Yuan’s “Erya Yi” (Song Dynasty), Su Shi’s “Dangquan Ting” stone carvings (Song Dynasty), and the cultural relics such as the wine container. Yang county black rice has been listed as “tribute” by many dynasties since Martial Emperor of the Han Dynasty. Accordingly, Yang county is recognized as the home to black rice in China. In 1986, Yang county was listed as a national high-quality agricultural product base. In 1995, Yang county was listed as the national black rice comprehensive

standard demonstration area by the State Bureau of Technical Supervision. In April 2006, Yangxian black rice became a national geographical indication product. In 2010, the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China explicitly supported Yang county to establish a national organic industry base County. In 2015, CNCA awarded Yang county the "National Organic Product Certification Demonstration Zone". By 2020, a total of 35 organic production enterprises have been established, 15 categories and 85 kinds of organic products have been certified, from 144,200 mu of land and with an output of 36,900 tons, and the output values have been 1.179 billion Yuan.

5 Discussion and Conclusion

Promoting poverty alleviation and rural revitalization through the development of organic agriculture in Yang county is a new rural development model. This study reveals the coordinated relationship between environmental protection and sustainable development through data and knowledge opening. Data mainly cover physical geography, rice variety characteristics, management, and crested ibis protection. This dataset can be used to quantitatively study the relationship between black rice production and natural environment in Yang county. In order to better understand the market and scale of organic black rice in Yang county, it is necessary to monitor the spatial dynamics of organic black rice, and the variations of water, soil, atmosphere and biomass in planting areas, so as to provide scientific support for modern organic agriculture development.

Author Contributions

Wang, Y. S. designed the study, investigated and analyzed the data, writing the paper. Yang, Y. Y. was responsible for data development, preliminary analysis, management and data verification. Liu, Y. S. selected topic, supervised content and progress, and provided fund. Zhang, X. R. contributed to data collection and development, visualization, and preliminary analysis. Du, L. M., and Liu, H. C. collected and validated data. Bai, Y. contributed to data collection and development, and preliminary analysis.

Conflicts of Interest

The authors declare no conflicts of interest.

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