

Online Exchange Program with Overseas Universities

Sustainable Production and Ethical Consumption

Learning from Nishi-Awa's Buckwheat Farmers
-Lasting 400 Years Practices-

Tokushima University

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Contents of the Handbook

Fostering understanding of producers to support sustainable production activities

“Local production for local consumption,” a form of ethical consumption, can be established as an activity when local producers grow and process their products.

As a first step toward sustainable consumption activities, the goal is to learn about the challenges faced by producers in each country and to deepen sharing and understanding.

We set the goal of knowing, sharing, and deepening understanding of the issues faced by producers in each country.

○ **Understanding the challenges faced by producers.**

- Conduct fieldwork and other activities to understand the issues

○ **Act as a producer and promote understanding**

- Mutual understanding through actual production support and supply activities

Understanding of sustainable production and consumption activities

Social Background

- Agricultural culture that has continued for more than 400 years is **in danger of extinction**. (**Limits of Local Production for Local Consumption**)
- **On the subject of native buckwheat cultivation** on “Steep Slope Land Agriculture System” designated as a “Globally Important Agricultural Heritage Systems.”
- Economic **imbalance** between production activities and consumption (**Evaluation of ethical consumption**)

Producer’s point of view

- Implementation of **communication with producers (Mr. and Mrs. Nishiokada)** through farm work
- Experiences and records of **buckwheat cultivation and processing into buckwheat rice** that has continued for 400 years.
- **Hearing about Mr. and Mrs. Nishiokada’s thoughts in buckwheat cultivation and buckwheat rice production**, which they have been lasting 68 years.

Sustainable production

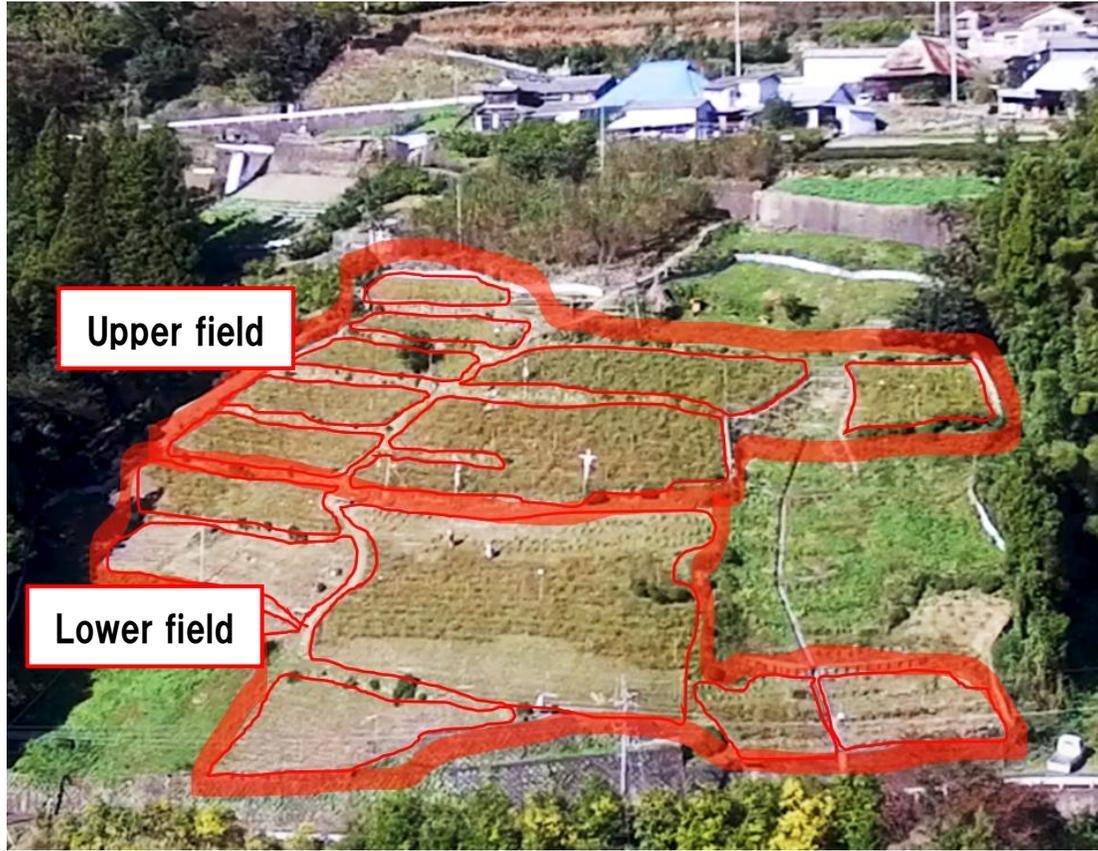
- **Biological evaluation** of buckwheat cultivation (Growth analysis ▪ Taste evaluation)
- **Assessment of sustainable production activities** in harmony with nature (Classification of symbiotic species)
- Close coverage of **next-generation resource preservation and food processing**(buckwheat)

Consumption activity, evaluation and analysis

- Social perspectives (Humanistic element ▪ Social Impact)
- Economic perspectives (Profitability)
- Nature Positive Perspectives
- **Ethical Consumption Perspectives**

Understanding buckwheat cultivation and surveying arable farmland

Conducting farm work



Count the number of buckwheat stocks by measuring the horizontal rows.

Approx. 318,593 stocks
(All by hand)



Buckwheat cultivation making rows (traversing) 4.7km, all by hand



sowing buckwheat seeds (handwork) sow 320,000 seeds evenly.



buckwheat cultivation (handwork) reaping 320,000 Plants, carrying on backpacks

Total distance of traversed rows

4,734m/25a

Average number of stocks/ 1m

49(Upper fields)
83(Lower fields)

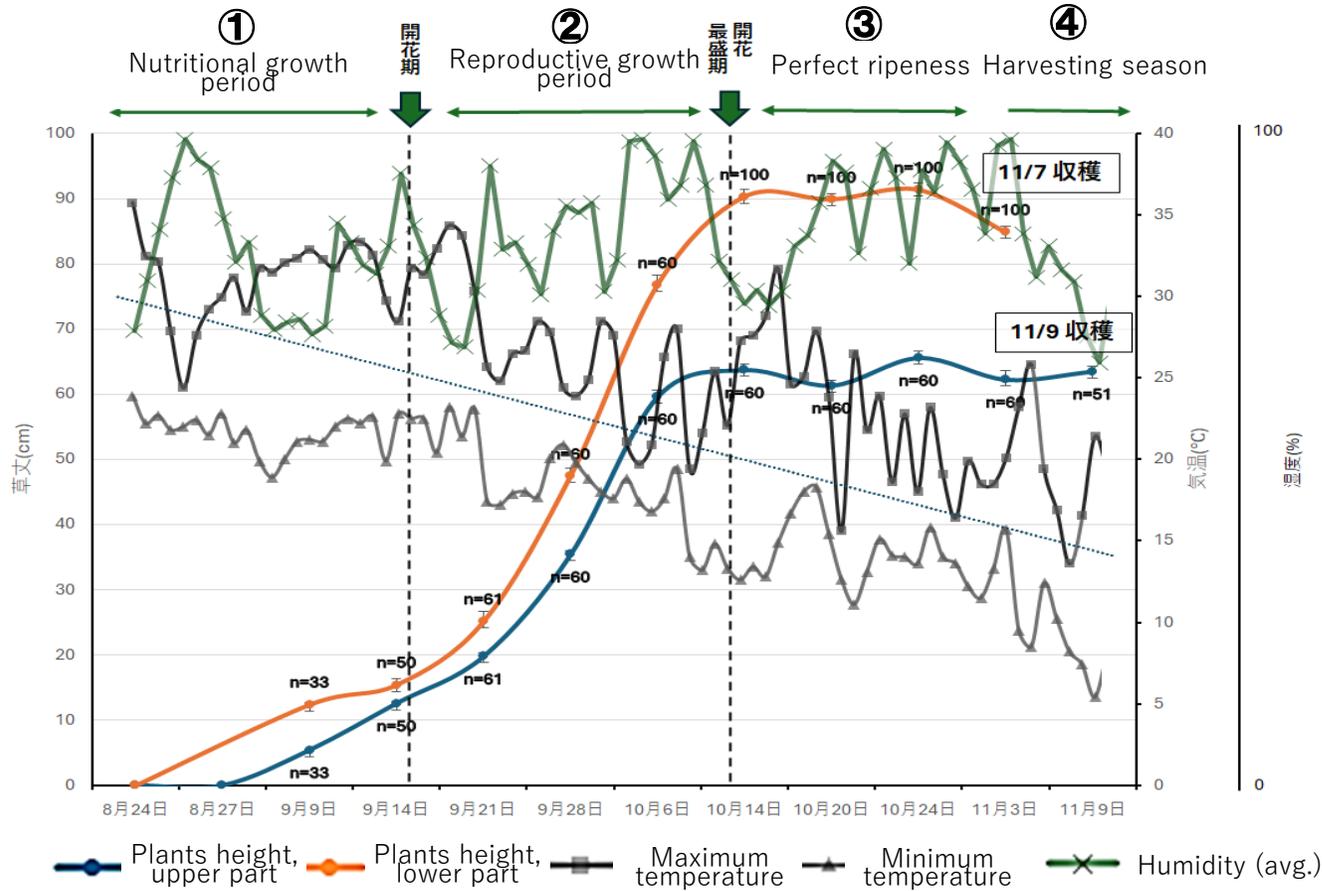
Estimated Gross Yield

438.21kg/25a

Because of the steep slope and the inability to use machinery, 4.7 km of ridges were created by hand, 320,000 seeds were sown, and 400 kg of buckwheat was harvested.

Characterization of native buckwheat growth and fixed-point observation in Nishiokada's farm

Variation in native buckwheat growth and temperature (2024)



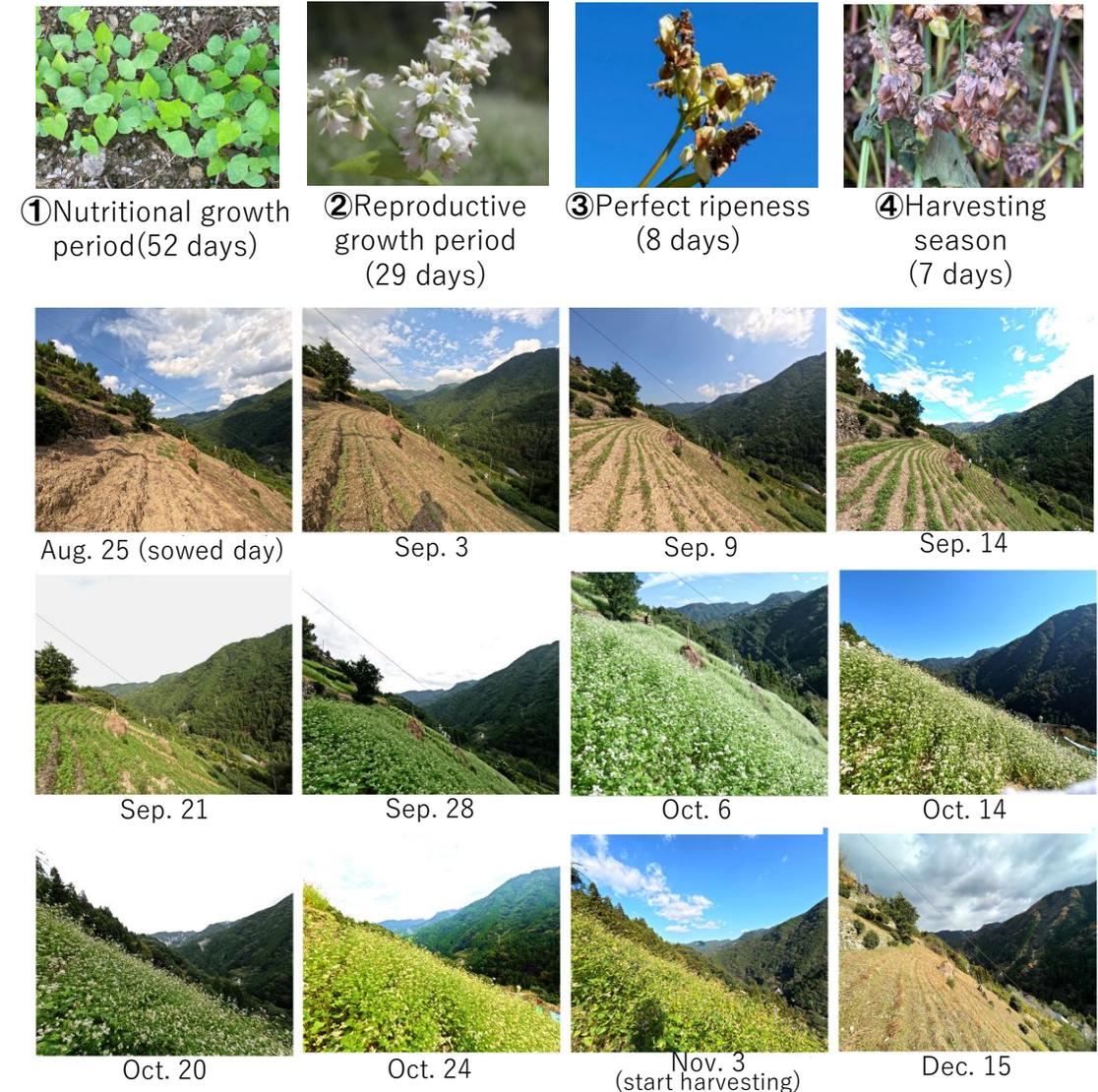
Growing period : Aug.24~Early Nov. (70~80days)

Aug. 25, Sowing period (Max. 36.2°C)

⇒ Nov. 7, Harvesting period (Max. 14°C) ⇒ **22.2°C Temperature difference**

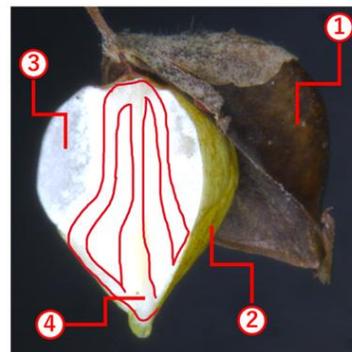
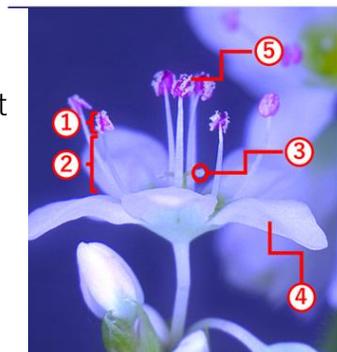
Cultivation period is as short as 80 days or less, grows in temperature difference of 20°C or more.

Learn why buckwheat is grown here.



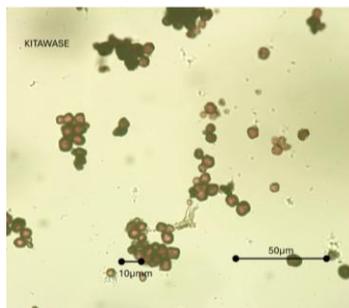
Biodiversity in terms of buckwheat characteristics and vector insects in Nishiokada's farm

- ① Anther
- ② Filament
- ③ Stigma
- ④ Calyx
- ⑤ Pollen (50 days passed)

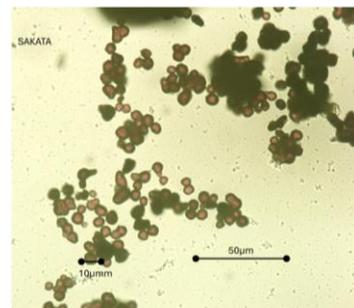


- ① Husk (peel)
- ② Cuticle
- ③ Albumen
- ④ Calyx
- ⑤ Embryo bud (70 days passed)

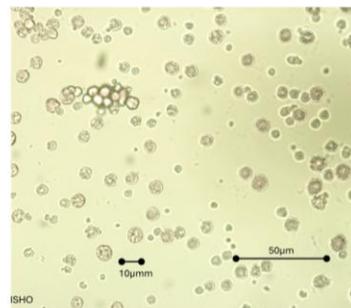
Micrograph of starch grains in buckwheat seeds (Enlarged 400x)



キタワセ (R5年産)



サカタ観賞用



西岡田在来

Native buckwheat has **unevenly sized** starch grains



Processed properly to **add originality** to **flavor and texture**



Unlike native varieties, starch grains are large, a characteristic of native buckwheat in Nishiokada's (diversity)

Rich ecosystem with 20 major insect species and more than 16 other species

交配昆虫 (虫媒)

ハチ目	(1)ニホンミツバチ (<i>Apis cerana</i>)、(6)ヤマトアシナガバチ (<i>Polistes japonicus</i>)
ハエ目	(3)オオハナアブ (<i>Phytomyia zonata</i>)、(16)キゴシハナアブ (<i>Eristalinus quinquestriatus</i>)、(17)キベリヒラタアブ (<i>Xanthogramma sapporensis</i>)、(18)スキバツリアブ (<i>Villa limbata</i>)
チョウ目	(7)イシガケチョウ (<i>Cyrestis thyodamas</i>)、(8)キタキチョウ (<i>Eurema mandarina</i>)、(9)タテハチョウ科 (<i>Nymphalidae</i> sp.)、(15)ミスジチョウ (<i>Neptis philyra</i>)、(2)ヒメウラナミジヤノメ (<i>Ypthima argus</i>)、(11)モンシロチョウ (<i>Pieris rapae</i>)
コウチュウ目	(12)コアオハナムグリ (<i>Gametis jucunda</i>)

捕食昆虫

ハチ目	(14)スズメバチ科 (<i>Vespidae</i> sp.)
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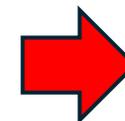
食害昆虫

チョウ目	(5)ハスモンヨトウ幼生 (<i>Spodoptera litura</i>)
コウチュウ目	(19)ニジュウヤホシテントウ (<i>Epilachna vigintioctopunctata</i>)

- Over 400 years of cultivation (Seeds' strength)
- Characterized by a rich taste unlike cultivated varieties
- **Resilient to environmental changes**

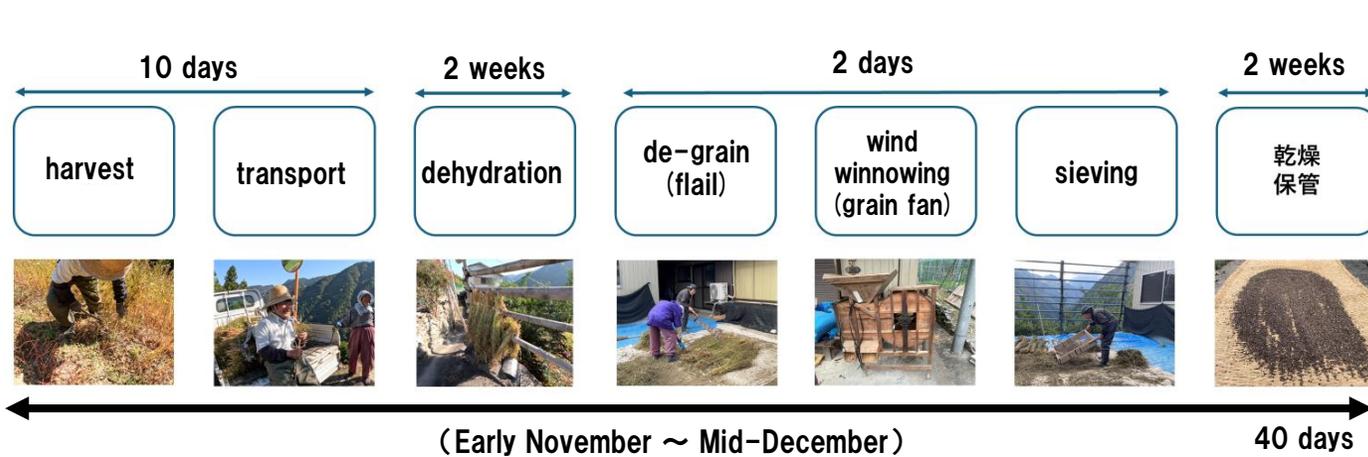


- **Diversity** of insects flying in
- Natural predators (**pesticides not used**)
- **Coexistence with ecosystem**



- **Biodiversity Conservation**
- **Promoting sustainable agriculture**

Sustainable processing of native buckwheat in Nishiokada's farm (preservation and food processing)



The first process focuses on seed preservation of native buckwheat

Fallen buckwheat seeds

↓

Stored until next fiscal year for sowing (cool dark place)

Maintained and handed down since over 400 years ago (Edo period) (before the Encyclopedia on Agriculture)

- Separating for buckwheat rice (processing) and seed for the next fiscal year
- Seeds for buckwheat rice are pretreated for medium- to long-term preservation
- Live cell condition (seed)
- Separation and dry storage process
- Having germination ability



The second process focuses on food processing (buckwheat rice)

- Food Processing Processes
- Heating to improve threshing performance
- insect repellent effect (salinity :13%)
- ➡ for medium- to long-term preservation
- Threshing while leaving buckwheat germ (enhancing flavor)
- Improving ease of eating (early absorption)

The threshing process using "Daruma-usu" mortar, craftsman's hands worked on it for 68 years, since the age of 15, they radiate irreplaceable beauty.



Total processing days 78 days

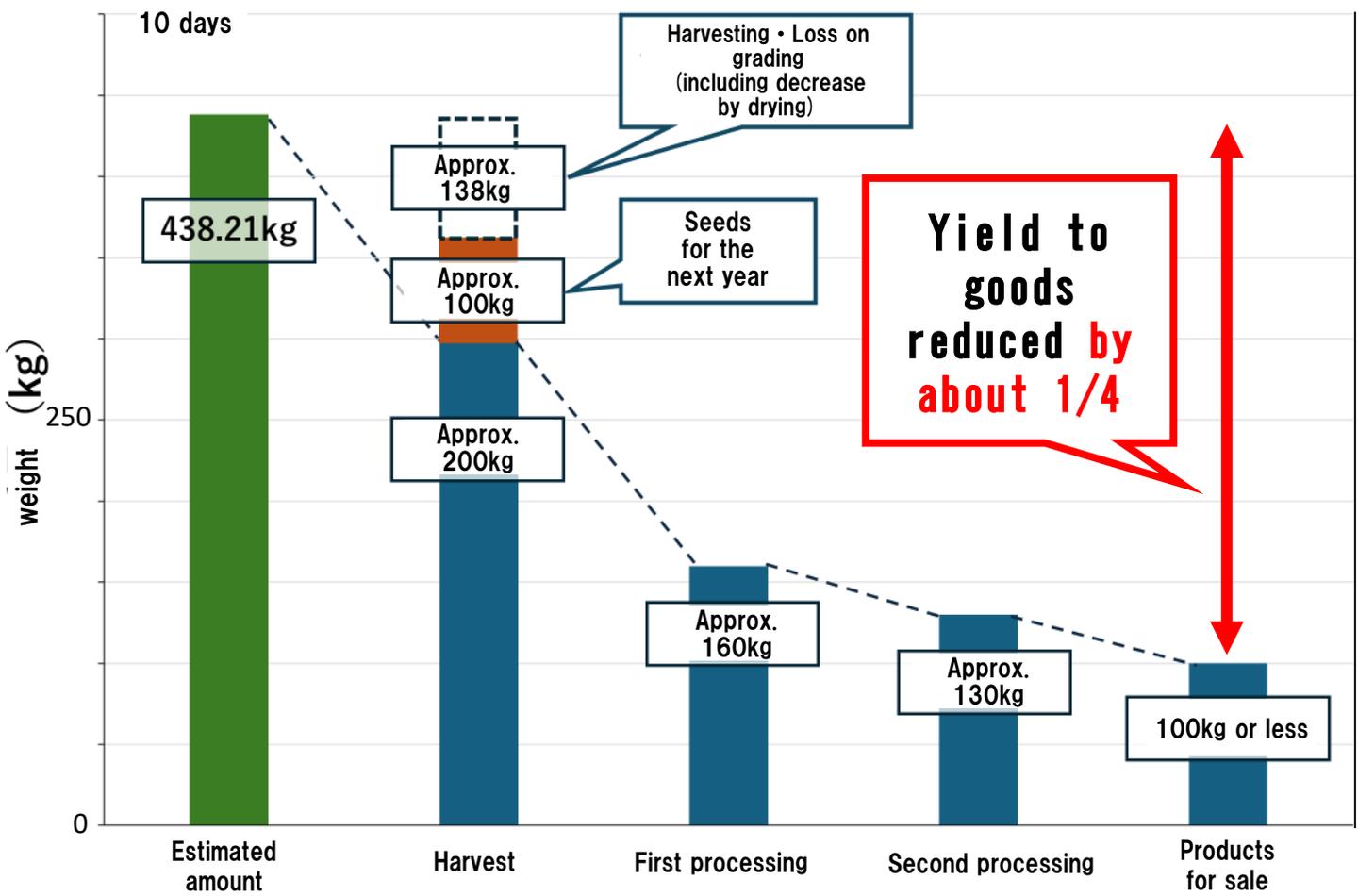


Production and processing losses and the value of the sales price (Ethical Consumption?)

Value Change in Buckwheat Prices due to World Agricultural Heritage Designation

	Before Designation	After Designation
GIAHS:世界農業遺産		
年代	~ 2018	2018~
価格	0.5JPY/g	5~6JPY/g
収益	22K~25K JPY/10a	220K~300K JPY/10a

Price Approx. 10X higher



Main Sales Locations :
Sadamitsu Yu-Yu Kan roadside station
(Local Production for Local Consumption)



Retail price 864 JPY/150g/bag

Valued as price in 2024 value basis.

Growing period :Approx.80 days
80 days × 8 h × 980JPY*
= 627,200JPY

Processing period : Approx.78 days
78 days × 8 h × 980JPY*
= 611,520JPY

Total labor cost 1,238,720 JPY

*Minimum wage in Tokushima

Whether the sales price is fair or not

Summary of the Handbook

- Native buckwheat in Nishioka's has a history of over 400 years. It is a valuable surviving document that records the agricultural culture before the "Encyclopedia on Agriculture" compiled in 1697. Its historical and cultural value is extremely high, and the agricultural system is worthy of "Globally Important Agricultural Heritage Systems." We were educated and nurtured by the producers.
- This native buckwheat cultivation and processing method has been inherited as a region-specific technique and continues to be a sustainable production activity. Properly understanding the value of these traditional farming methods and developing them with local communities will promote ethical production and consumption.
- However, under the current production system, there is a remarkable imbalance between costs and selling price. Previously, the area did not receive a reasonable evaluation, but with its recognition as a "Globally Important Agricultural Heritage Systems," prices rose 10 times, and the value of the area was reevaluated through the dissemination of information. While ethical consumption is being promoted, the value differential is still a major issue and cannot be easily resolved through price shifting.
- For almost 70 years, Mr. and Mrs. Nishiokada have continued to farm with uniqueness, which they take as their "pride of life. Sympathizing with their beliefs will help foster "nature-positive" values that emphasize living in harmony with nature.
- In order to pass on this valuable local resource to the future, it is essential to preserve and pass it on through scientific research and hands-on experience by students. We believe that such efforts will help spread the philosophy of ethical consumption throughout society and lay the foundation for a sustainable future.

Ethical consumption, as we see it, is a consumption activity in which both producers and consumers can benefit. We will engage in activities to promote equal consumption activities based on mutual cooperation.

**Thank you very much
for your interest.**