Production and Processing Facilities for Edible Wild Plants in Hokkaido

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北海道における山菜の生産と加工施設

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Abstract

In accordance with an active demand for natural food, a large number of processing facilities for edible wild plants have been built in the mountain villages and towns of Hokkaido through government subsidies since 1970. Even though edible wild plant resources are abundant, it can not be said that these facilities are succsessfully managed, because the collecting periods are limited within a particular season and the markets for the products are unstable.

In order to search for a way to achieve the full development of edible wild plant enterprises, this study was carried out by analyzing the conditions of edible wild plant production and their processing facilities in Hokkaido. The following are some recommendations to achieve this goal: ① Establish an efficient collecting system in terms of the plants themselves as well as the organization of the labor force used based on the premise that there exists abundant resources of edible wild plants in the regions. ② Rebuild processing facilities in accordance with the amount of wild plant resources available. ③ Intelligently arrange the processing equipment, as well as the storage and delivery systems of the products. ④ Provide stable quantitative transactions for the marketing of the products. ⑤ Improve the quality of the products to enhance their distinctive taste. ⑥ Advertise more widely. ⑦ Promote the assistance of governmental authorities in the respective regions.

Key words: Edible wild plants, Processing facilities, Marketing.

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1. Introduction

Hokkaido is a treasury of edible wild plants together with the Tohoku District in Japan. It is said that the Ainu, aboriginal hunting and gathering tribes in Hokkaido, used more than 80 kinds of wild plants for their food. Nowadays, 40 to 50 kinds of edible wild plants have been utilized by people who love natural food.[2] In the meantime, the demand for natural foods has been lately increasing with several kinds of edible wild plants and their processed products being found even at stores in urban cities, so people can eat their favorite edible wild plants even it they do not go out to fields or mountains.

This study views the trends in the production and processing facilities for edible wild plants in Hokkaido.

Mountain villages have been largely transfigured by changes in the structuring of industry along with the rapid development of capitalism in Japan after World War II, and their population has diminished. The present mountain villages consider it to be an essential matter to find a way to revive their regional industries and to maintain their population levels. The production of edible wild plants and their processed products is one of the important ways that these purposes are being worked toward. However, even though edible wild plant resources are abundant, because their collecting periods are limited by the season, outlets for the products are unstable, and so on, the success of the edible wild plant industry is spoken of only in qualified terms.

Now I am going to touch upon trends in the availability of edible wild plant resources, the production and marketing of edible wild plants, and the processing facilities in Hokkaido in order to investigate the direction of developments in the production of edible wild plants, and to try to assess the conditions related to the formation of facilities for processing edible wild plants.

2. Edibie Wild Plant Resources in Hokkaido

Hokkaido ranges from the northern part of Temperate Zone to the Subfrigid Zone on the basis of phytogeography, and approximately 1,600 kinds of plants are enumerated.[1]

Among them, approximately 150 kinds are edible, and it is said that those which are now served on the table number between 40 to 50. The main plants distributed on the market include osmund (*Osmunda nica*), fernbrake (*Pteridium aquilium*), bamboo shoots (*Sasa kurilensis*), udo (*Aralia cordata*), and butterbur (*Petasites japonicus*). Collecting periods range from the beginning of April to the end of August, differing according to the kind of plant involved, and the amount of the edible wild plant resouces available varies, depending on the region, between abundance and scarcity. But, in general,it can be said that osmund, fernbrake, bamboo shoots, udo, butterbur, etc., which have been circulating as marketable products, copiously exist in all regions in Hokkaido.

Table-1 shows examples based on

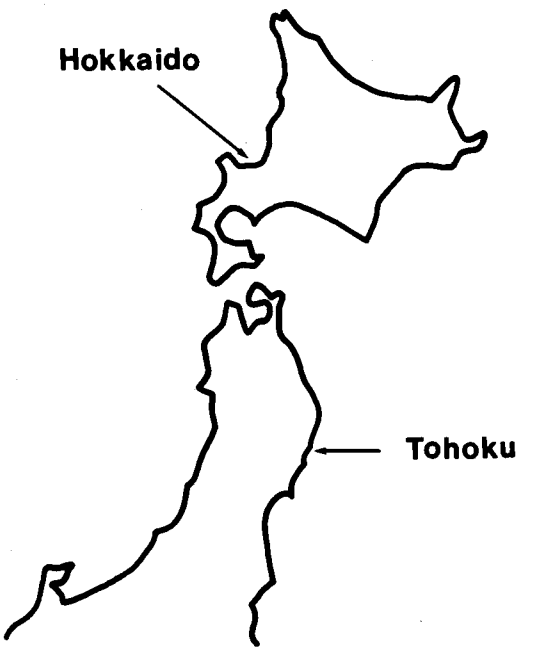

Fig. 1. Location of Hokkaido and Tohoku region

Table 1. Examples based on research on the edible wild plants resources

District		Soya			Abashiri		Kamikawa	Tokachi	Hiyama
Town and Village		Toyotomi T.	Nakatonbetsu T.	Otoineppu V.	Nishiokoppe V.	Tsubetsu T.	Toma T.	Asyoro T.	Kaminokuni T.
Total area of forest land (ha)		29,116	34,988	22,448	27,461	61,742	13,434	116,173	50,314
Butterbur	Thick growing area (ha)	100	2,240	50	435		4,772	?	631
	Resource amount (t)	2,000	357	200	1,656		3,140	2,000	1,388
	Annual collecting amount (t)	200	50	42	165		100	259	204
Bamboo shoots	Thick growing area (ha)	2,000	530	4,000	450	394			1,401
	Resource amount (t)	1,440	110	800	109	1,143			420
	Annual collecting amount (t)	150	20	26	22	170			125
Osmund	Thick growing area (ha)	200	100	300				?	1,375
	Resource amount (t)	200	10	30				1,000	687
	Annual collecting amount (t)	40	2	5				8	50
Fernbrake	Thick growing area (ha)		500	20	650	300	5,351	?	352
	Resource amount (t)		12	10	117	68	1,060	2,000	105
	Annual collecting amount (t)		3	2	18	20	15	30	21

Footnote: By the Data of Department of Forestry, Hokkaido Prefectural Office

research on the edible wild plant resources of eight towns and villages (the amount of edible wild plant resources in all the regions of Hokkaido is unknown as of yet because such research has not been executed). This research was conducted with a view towards forming a perspective on the way to maintain the supply of plant materials to the processing facilities, which suggests that the regions where wild plant resources are abundantly found and people can efficiently collect them are the only suitable places for locating processing facilities. For instance, in the case of Toyotomi Town, which is under the jurisdiction of the Soya Branch Office, the areas where good quality butterbur grows abundantly covers 100 ha within 29,100 ha of forest land, with 2,000 t. being harvested. The figures for bamboo shoots are 2,000 ha and 1,440 t., and for fernbrake, 200 ha and 200 t.. It is said that in general, for the sake of maintaining edible wild plant resources, it is essential to restrict the annual amount collected to about 10% of the amount growing naturally. In this respect, in case of this town, the processed amount of edible wild plants was 137 t. in 1986, which seems to indicate that adequate resources are available. Likewise the wild plant resources available in the other towns and villages examined also seem sufficient in their abundance.

3. Production and Marketing of Edible Wild Plants

Edible wild plants have been collected by people who have intimate access to nature for the purpose of obtaining family provisions as well as by traders who engage in relatively large scale organized collection and production for sale on the market. However, the amount of edible wild plants collected in the past and being collected today by the former is unknown, and also there are no precise statistics on the amount of the production for the market by the latter. The statistical data mentioned below is from the main centers of production.

Table-2 is illustrates the amount of edible wild plants produced in the different regions in Hokkaido. The amount of edible wild plants produced sharply increased from 1970 to 1975 with the natural food boom, with 911 t. of bamboo shoots, 1,590 t. of butterbur, 40 t. of osmund, and 563 t. of fernbrake being marketed in 1975. But since then there has been a gradual decrease, with 700 t. of bamboo shoots, 1,582 t. of butterbur, 17 t. of osmund, and 135 t. of fernbrake being marketed in 1980. Afterward, it fell to 242 t. of bamboo shoots, 958 t. of butterbur, 18 t. of osmund, and 108 t. of fernbrake. If these figures are brought into comparison with those in 1975 when consumption was at its peak, one finds that bamboo shoots production declined to 27%, butterbur to 60%, osmund to 45%, and fernbrake to 19%. On the other hand, looking at the production figures according to different districts, one finds ups and downs in the centers of production along with regional biases in the amount produced. For example, in case of bamboo shoots in 1975, the Soya District with a production of 317 t. was the first on the list, with Sorachi producing 161 t., Hiyama 139 t., Shiribeshi 135 t., Iburi 104 t. (they accounted for 94% of the total). For butterbur the figures for 1975 are Sorachi 433 t., Kushiro 225 t., Hidaka 206 t., Hiyama 191 t., Iburi 165 t., Shiribeshi 107 t. (accounting for 83% of the total). But in 1980, Soya which had produced 317 t. of bamboo shoots, decreased to 48 t., while Hiyama increased its production from 139 to 304 t.. And in case of butterbur, at the same time that Kushiro

Table 2. Produced amount of edible wild plants in Hokkaido

District	1975				1980				1985			
	Bamboo shoots	Butterbur	Osmund	Fernbrake	Bamboo shoots	Butterbur	Osmund	Fernbrake	Bamboo shoots	Butterbur	Osmund	Fernbrake
	t	t	t	t	t	t	t	t	t	t	t	t
Ishikari	36.0	95.0	2.4	20.5	17.7	27.9	0.5	15.7	15.0	9.5	—	—
Oshima	16.0	20.0	9.0	7.0	17.5	22.6	7.6	8.2	14.1	41.7	—	6.6
Hiyama	138.7	190.9	2.2	15.3	303.5	118.0	5.4	6.2	8.5	7.5	0.1	0.4
Shiribeshi	135.2	106.9	0.1	42.5	96.6	130.8	—	19.9	78.7	58.7	0.1	43.2
Sorachi	160.9	433.4	2.2	162.5	78.4	137.8	—	12.2	7.7	166.4	0.5	2.6
Kamikawa	—	12.0	1.4	2.0	3.9	256.7	1.5	4.9	5.8	143.9	17.1	34.0
Rumoi	2.0	2.0	—	4.1	—	—	—	—	18.0	—	—	—
Soya	317.0	40.0	—	—	48.4	79.3	—	2.2	18.9	90.1	—	0.3
Abashiri	1.6	61.3	0.3	66.0	5.0	0.4	—	0.4	21.6	76.0	—	3.6
Iburi	104.0	165.0	—	10.1	129.0	151.0	—	—	54.0	55.4	—	—
Hidaka	—	205.5	—	7.6	—	—	—	—	—	—	—	6.0
Tokachi	—	29.2	22.5	68.1	—	118.0	—	22.0	—	198.5	—	10.8
Kushiro	—	225.4	—	125.8	—	495.0	1.5	41.8	—	92.0	—	—
Nemuro	—	3.1	—	31.3	—	44.9	—	1.4	—	17.8	—	—
Total	911.4	1589.7	40.1	562.8	700.0	1582.4	16.5	134.9	242.3	957.5	17.8	107.5

Footnote: Calculated by Hokkaido special forest product statistics.

developed its production amount from 225 t. to 495 t., Kamikawa with 257 t. and Tokachi with 118 t. joined in as being centers of production. In 1985, in spite of the sudden decrease in the total production amount, in case of bamboo shoots, Shiribeshi still produced 79 t. and Iburi 54 t. (accounting for 55% of the total) and in case of butterbur, Tokachi produced 199 t., Sorachi 166 t., Kamikawa 144 t., Kushiro 92 t., and Soya 90 t. (accounting for 72% of the total).

As seen above, among the 14 districts a trend is observed where the main centers of production of edible wild plants become concentrated in 5 or 6 regions. In addition, the main centers of production often shift from district to district, but as mentioned later, this seems to have deep relations with the regional movement to construct edible wild plant processing facilities as well as the decline of existing facilities. The main centers of production are often found near larger cities. Shiribeshi, Sorachi and Iburi are situated relatively close to the Sapporo area, a big center of consumption, and the Kushiro District includes the City of Kushiro which accounts for their having become main centers of production. Recently the Kamikawa District which includes the City of Asahikawa and the Tokachi District which includes the City of Obihiro have also become main centers of production.

As mentioned above, the formation of and transitions among the main centers of edible wild plant production are not based on the existing amount of edible wild plants in the regions, but instead are greatly influenced by conditions relating to the location and existence of the processing facilities.

Table-3 shows the amount of edible wild plants distributed in the Sapporo area, the biggest market in Hokkaido.

Table 3. The amount of edible wild plants distributed in the Sapporo area

Kind	Product	Producing center	Year			
			1983	1984	1985	1986
			t	t	t	t
Bamboo shoots	Fresh product	Hokkaido	16.1	9.7	8.5	9.6
		Outside Hokkaido	113.8	72.1	116.3	97.9
		Total	129.9	81.8	124.8	107.5
	Canned product	Hokkaido	19.3	15.5	12.5	14.9
		Outside Hokkaido	43.1	21.3	15.8	18.7
		Total	62.4	36.8	28.3	33.6
	Boiled product	Hokkaido	62.5	38.2	42.5	48.3
		Outside Hokkaido	13.8	13.1	20.3	13.6
		Total	76.3	51.3	62.8	61.9
Butterbur	Fresh product	Hokkaido	67.5	76.2	60.0	87.3
		Outside Hokkaido	14.8	15.5	14.7	14.7
		Total	82.3	91.7	74.7	102.0
	Canned product	Hokkaido	56.3	42.1	40.5	53.0
		Outside Hokkaido	18.6	13.2	4.1	9.5
		Total	74.9	55.3	44.6	62.5
	Boiled product	Hokkaido	250.9	296.4	398.8	314.9
		Outside Hokkaido	2.1	2.4	2.7	1.3
		Total	253.0	298.8	401.5	316.2
Fernbrake	Fresh product	Hokkaido	3.6	3.0	2.3	3.3
		Outside Hokkaido	0.5	0.8	0.7	0.8
		Total	4.1	3.8	3.0	4.1
	Canned product	Hokkaido	7.3	7.5	2.6	3.6
		Outside Hokkaido	9.5	9.2	11.8	12.7
		Total	16.8	16.7	14.4	16.3
	Boiled product	Hokkaido	3.3	5.7	4.3	4.7
		Outside Hokkaido	28.9	22.7	25.1	25.8
		Total	32.2	28.4	29.4	30.5

Footnote: Calculated by the annual report of Sapporo Central wholesaling Market.

Though fluctuation can be observed in the amount of edible wild plants delivered to the Sapporo Central Wholesaling Market, viewing the combined totals for fresh products, boiled products and canned products since 1983, one finds that bamboo shoots ranged from 170 to 270 t., butterbur from 410 to 520 t., and fernbrake from 47 to 53 t.. The proportion supplied from Hokkaido compared to other areas is as follows: bamboo shoots from 29 to 37%, butterbur from 91 to 96%, and fernbrake from 20 to 33%. In case of fresh bamboo shoots, more than 90% came from outside Hokkaido, and in case of boiled bamboo shoots as much as from 70 to 80% is produced in Hokkaido. With fernbrake, most of the boiled products and canned products are transported from outside Hokkaido, particularly from

processing centers in the Tohoku and Hokuriku regions, and it is said that most of fernbrake used for processed products is imported from China and the Republic of Korea, etc.

Concerning the production amount of edible wild plants in Hokkaido, in 1985 (bamboo shoots 242 t., butterbur 958 t. and fernbrake 108 t.), the approximate amount distributed in the Sapporo area, including fresh products, boiled products and canned products, was for bamboo shoots 64 t. (26%), for butterbur 499 t. (52%), and for fernbrake 9 t. (8%). Thus, for butterbur the greater part of the total amount produced in Hokkaido was sent to the Sapporo Market, but as far as bamboo shoots and fernbrake are concerned, the Sapporo Market is dominated by the edible wild plants produced outside Hokkaido. It is implied by these figures that the exploitation of the market in the Sapporo area for bamboo shoots, fernbrake, etc. produced in Hokkaido is an important concern for producers in Hokkaido.

4. Trends in the Processing Facilities for Edible Wild Plants

1) Processing of Edible Wild Plants and Collection of Plant Materials

(1) Processing of Edible Wild Plants

Though there are various ways of processing wild plants, the following methods are generally used.

① Butterbur

In order to maintain their quality, the collected plant materials should be preserved with salt as soon as possible and stored. The butterbur, in accordance with the amount ordered, is subjected to primary processing (desalinization) before being packed or canned and delivered. Besides primary processing, the butterbur also will be subjected to secondary processing (seasoning, etc.) before being delivered.

② Bamboo Shoots

The plant materials should be swiftly boiled. After boiling, they are to be quickly put into flowing water to cool, and then be peeled. After peeling, they are to be arranged by their shape. Afterward, they are to be deaerated, sterilized, and then stored at cold temperatures after being packed, bottled, or canned. They will be delivered according to the quantity ordered. In addition to primary processing the products will also be subjected to secondary processing (seasoning, etc.) before being delivered.

③ Fernbrake

After collection, the plant materials should be swiftly boiled. Immediately after boiling, they are to be cooled. Then, removing kinks by hand while they are being dried, they are brought to the state of being finished products by being completely dried.

(2) Collection of Plant Materials

Concerning the collection of the plant materials, it is generally conducted for bamboo shoots, fernbrake, and osmund between May and June, and for butterbur between June and July. The amount collected per person per day differs according to the abundance and quality of the plants in the wild, but in the instance of Nakatonbetsu Town in the Soya District (in plan), 200 kg of butterbur, 60 kg of bamboo shoots, and 100 kg of fernbrake and osmund were collected. (See Table-4)

Table 4. Examples of the plant materials collection at Nakatonbetsu Town, Soya District (in plan)

Kind	Season of collection	Collecting amount per person per day (kg/day)	Unit cost of production (yen/kg)	Wage per person per day (yen/day)	Remarks for reference
		kg	yen	yen	
Butterbur	June and July	200	47	9,400	General wage of forestry, per person per day: 7,000~9,000 yen
Bamboo shoots	May and June	60	170	10,200	
Fernbrake	June and July	100	50	5,000	

Footnote: By the establishment plan of processing facility for edible wild plants at Nakatonbetsu Town office.

2) Transitions in the Operation of Processing Facilities with the Change of Times

Concerning the movement to establish processing facilities for edible wild plants in Hokkaido and the transitions occuring with the change of times since then, because of the dearth of statistical data, it is impossible to explicate all the issues concerned, but nevertheless much can be clarified. Regarding the processing facilities for edible wild plants built since 1971 with the support of various enterprises under subsidies of the national government, the prefectural government, cities, towns, villages, etc., they are shown in Table-5, divided according to region and time of year.

As indicated, they have been established convergently from 1970 to 1980, and their establishment corresponds periodically to the transition in the amount of edible wild plant

Table 5. Processing facilities for edible wild plants established by supporting enterprises under subsidies.

District	Established number of facilities				Existing processing facilities
	1971 ~ 1975	1976 ~ 1980	1981 ~ 1985	Total	
Ishikari	1		1	2	1
Oshima					
Hiyama	1	1		2	1
Shiribeshi		1	1	2	1
Sorachi	2(2)		1	3(2)	2
Kamikawa	2	(1)	1(2)	3(3)	2
Rumoi					
Soya	1	2		3	2
Abashiri	2			2	1
Iburi					
Hidaka					
Tokachi	1	1(1)		2(1)	1
Kushiro					
Nemuro	1			1	1
Total	11(2)	5(2)	4(2)	20(6)	—
Existing processing facility	6	2	4	—	12

Footnote: 1. By Hokkaido special forest product statistics, and the author's researches
2. Parenthesized number is additional enterprises, and outside number

products produced in Hokkaido as mentioned above. Viewing them in terms of the number established in each District, one finds that Ishikari owns 2, Hiyama owns 2, Shiribeshi owns 2, Sorachi owns 3, Kamikawa owns 2, Soya owns 4, Abashiri owns 2, Tokachi owns 3, and Nemuro owns 1, which mean that there exists a deep interrelation between the regions which form the main centers of production for edible wild plants and the establishment of processing facilities for edible wild plants. And according to the data, 13 of the 20 processing facilities built under subsidies still exist (1 in Ishikari, 2 in Hiyama, 1 in Shiribeshi, 2 in Sorachi, 2 in Kamikawa, 2 in Soya, 1 in Abashiri, 1 in Tokachi, and 1 in Nemuro).

The author has investigated the transitions occuring with processing facilities for edible wild plants on the basis of scanty data. In the meantime, speaking of the processing facilities for edible wild plants, in addition to the above mentioned facilities, there are many facilities run under private management. Their basic character is not distinct, and so in either case, the management of processing facilities for edible wild plants can be said to be problematic, with conditions never remaining stable, as was seen in the transitions occuring with the change of times. Common difficulting causing bankruptcy and discontinuance of business are ① Difficulties in maintaining an adequate supply of plant materials (for example, in the case of Hiyama District, even though there were abundant edible wild plant resources, it did not possess sufficient labor to collect plant materials and had the further problem of having exhausted the good quality plant materials.) ② Poor management (operation, management of the facilities, development of products, etc.) ③ Unsettled conditions in the distribution of products (fluctuation in volume of trading and price, problems in maintaining regular customers to deliver to, etc.). How to deal with these conditions in order to insure success will be the key to the proper management of processing facilities for edible wild plants.

3) Processed Products of Edible Wild Plants and their Distribution

Processed products of edible wild plants have been produced through various organizations, such as unions of production, the Agricultural Cooperative Association, private dealers, etc., and since they are generally under small-lot production, it is hard to grasp substantively the basic character of their production.

Table-6 shows examples of the management of processing facilities for edible wild plants, which shows the main special processed products, their production amount, selling periods, and the customers, to whom the products are to be sold, along with the management organization. The management configuration of processing facilities in these 15 towns and villages is divided between the 9 facilities which are run by supporting enterprises urder subsidy, such as unions of production, Agricultural Cooperative Associations, etc., and the 6 facilities privately managed. Where under the management of unions of production, Agricultural cooperative Association, etc., relatively large scale production is generally engaged in combination with distribution in large centers of consumption, such as Sapporo, etc., often to local selling organizations, such as Agricultural Cooperative Associations. In regards to the products sold, they are generally relatively simple processed products, such as sets of assorted edible wild plants, packaged products, and canned products.

Table 6. Examples of the management of processing facilities for edible wild plants

District	Town and Village	Management configuration	Main processed product	Production amount	Selling period	Main customer
Sorachi	Horokanai T.	Union of production	Set of assortment	9 ton	Whole year	Private dealers of lacal end
Kamikawa	Otoineppu V.	〃	Various processed prodoct	105 ton	〃	Traders of Sapporo city
	Shimukappu V.	〃	Miso pickles	340 ton	〃	〃
Oshima	Shiriuchi T.	〃	Boiled udo	2 ton	12～4 month	Agricultural cooperative union
	Kamiiso T.	〃	〃	8 ton	2～4 month	Private dealers of local end
Hiyama	Kaminokuni T.	Private dealer	Bottled bamboo shoots	10 ton	whole year	Traders of Hakodate city
Soya	Utanobori T.	〃	Various pickles	15,000 bottle	〃	Private dealers of local end
Abashiri	Nishiokoppe V.	Agricultural cooperative union	Set of assortment	140 ton	〃	Traders of Sapporo city
	Shirataki V.	Private dealer	Bear canned product	8 ton	〃	Self-management store
Tokachi	Ashoro T.	Agricultural cooperative union	Fresh butterbur	127 ton	〃	Private dealers of local end
	Rikubetsu T.	Union of production	〃	35 ton	〃	Traders of Sapporo city
	Urahoro T.	Private dealer	Potato powder	—	〃	Self-management store
Kushiro	Onbetsu T.	〃	Packed butterbur	250 case	〃	〃
Shiribeshi	Niseko T.	〃	Boiled udo	1,440 case	〃	Private dealers of local end
	Shimamaki V.	Agricultural cooperative union	Canned bamboo shoots	40 ton	〃	〃

Footnote: By the Data and Statistics of Hokkaido Administration Society

In the case of private management, most of the facilities are small scale, and they concentrate on retail sales of secondary processed products at the local level in conjunction with the various other products. In either case, for successful management, it is, as mentioned above, important to insure a secure sales network receive an adequate transaction price, and maintain the supply of processed plant materials. In the case of those who specialize in small scale production and retailing through private management, production can be adjusted in response to demand, but in the case of the management of facilities in which the scale of production is fixed and a considerable number of employees are employed, it would be particularly important that a secure selling route and stable product price be obtained.

Table 7. Examples of the annual production volume in processing facilities

Facility	Project	Positive achievement										
		1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
	t	t	t	t	t	t	t	t	t	t	t	t
Kamikawa•S	305	103	117	209	208	240	368	351	374	339	—	—
	450	—	—	—	—	—	—	—	—	—	345	437
Tokachi•A	158	112	136	131	198	193	251	253	187	218	141	315
Soya•T	92	—	—	73	93	90	94	78	91	138	109	114
Abashiri•N	150	—	—	—	77	51	166	149	147	203	100	137
Kamikawa•O	53	—	—	—	—	62	50	—	—	—	—	—
	110	—	—	—	—	—	—	142	164	104	71	78

Footnote: By the Data and Statistics of Department of Forestry, Hokkaido Prefectural Office

4) Examples of the management of Processing Facilities for Edible Wild Plants

Table-7 shows positive achievements per annum production in 5 facilities built through government subsidies.

While for several years after the beginning of operations, an adequate supply of plant materials and a secure sales network could not be established and achievements in production capability were rather low, since that time stable management has been obtained through continued efforts. The character of the management at 3 facilities will be examined below.

(1) Kamikawa District: S. facilities

Since introduction of the facilities in 1972 by the supporting enterprises under government subsidy, the facilities have been enlarged and, at present, are the largest facilities in Hokkaido. In 1986, the total production amount grew to 437 t., with butterbur accounting for 235 t., fernbrake for 54 t., osmund for 10 t., and others for 138 t.. The annual volume marketed increased largely on account of the production of miso pickles made from edible wild plants by contract with the Sapporo Citizen Living Cooperativee Union which has the biggest demand, and consequently the management of the facilities have been stabilized. Successful management was also achieved by enlarging the collection networks to include every region in Hokkaido and by engaging in the importation of fernbrake and osmund.

(2) Tokachi District: A. facilities

In 1986, production was at the level of 315 t. with butterbur products predominating, evidencing successful management. Underlying this success is the participation of the Agricultural Cooperative Association in transactions, along with the dependence on fixed sales routes (80% of the sales being local). The important role of the Agricultural Cooperative Association is seen even in the collection of plant materials, with association members having been organized into unions of production (approximately 50 people in each region) to insure the maintenance of an adequate supply of plant materials.

The financial management in terms of the earnings and expenses of the facilities has also been going smoothly. In 1984, gross profits were as much as 72,680,000 yen (as much as 72,640,000 yen in sales and as much as 40,000 yen in miscellaneous income), expenses

amounted to 50,360,000 yen (as much as 45,150,000 yen in production costs, as much as 2,490,000 yen in business administration expenses, and as much as 2,720,000 yen for sundry sales charges), and net profits, deducting administration expenses, rose to 11,200,000 yen. Concerning employment, 13 people work for the duration of an average year (270 days), and from May to July, the busiest months in the year, from 20 to 40 people are employed. It provides stable employment opportunities in the region, together with the collection of fresh materials.

(3) Kamikawa District: O. facilities

They are relatively new facilities, and while having gone into a slump once, a reconstruction program was initiated which is gradually helping them to get on secure ground. There are fluctuations in the percentages of the products produced every year, but butterbur generally accounts for 70 to 80% of the total. Butterbur is mainly supplied by people at the local level who collect this plant. For the collection of bamboo shoots, 110 ha of forests owned by Hokkaido Prefecture are rented. With fernbrake imports supply 60%, and with osmund, 100%. The biggest problems for these facilities relate to the volume of transactions and the stability of prices as there can be difficulties in covering production costs, and therefore, it is essential for the facilities to be able to selectively maintain reliable customers to whom they can constantly supply.

In the busiest period (June to July), the facilities increase their temporary employment from 30 to 40 people. And the tatal of the wages paid to these employees and to the labors of collecting the plant materials acount for approximately 60% of the management expenses (approximately 85,000,000 yen). The facilities' effects on the regional economy have become significant.

5. Discussion

The author has observed the characteristics of processing facilities for edible wild plants in Hokkaido. With the decline in the rate of increase in the demand for edible wild plants, consequent to the ups and downs in the natural food boom, though processing facilities for edible wild plants have in general expanded since 1970 particulary because of steady developments in successful management, many processing facilities have been compelled to go out of business with a large amount of liabilities as aformentioned. This shows that success in the management of wild plant processing facilities can not be obtained merely by depending on the easy availability of wild plant resources in their regions. The factors leading to the realization of successful facilities for the processing of edible wild plants in Hokkaido will be outlined hereunder.

(1) Maintenance of the Supply of Plant Materials

a) To begin with, the existing amount of edible wild plants need correspond to the scale of the processing facilities. In other words, the significant factors for the stabilization of management are: ① there are massive quantities of good-quality edible wild plants regionally, ② there is a sufficient abundance of plant resources to give fallow after collection in order to prevent lowering of quality and quantity, ③ there is easy access to the collection spots simplifying removal, ④ the plots can be utilized exclusively or nearly

exclusively for wild plant collecting.

b) Secondly, it is indispensable to provide labor sufficient for the collection of the amount of plant resources available at any given period of time. This means that it is imperative to maintain both a permanent labor force and a tempolary one for the busiest period from June to July.

c) It will be obligatory to maintain an efficient system for the collection of edible wild plants at localities in the mountains and their delivery to factories. In some cases, it will be necessary to install equipments to preserve the collected plants in salt at the localities in the mountains.

d) Wage compensation for the labor of collecting edible wild plants (delivery prices for plant materials) should be more than the wages given at the local level or in neighboring regions.

e) In addition, planned cultivation should be examined, and the collection of plant materials from other regions should be considered when the occasion calls for this.

(2) Intelligent Operation of Processing Facilities

a) It is important that their scale be suited to the existing amount of resources and production plan, and that the collection and storage of the plant materials, the processing equipments, and the storage and delivery equipments for wild plant products are intelligently arranged, including water supplying and draining equipments and sanitary equipments. A key to the success of processing facilities is to increase efficiently value-added profits through producing processes, making the products more competitive on the market.

b) It is as a matter of course that the processing equipments should be arranged on the basis of the production efficiency of fundamental products, but it will also be necessary to arrange the facilities to be able to maximize the development of a diversity of products. Edible wild plants are subject to instabilities in the market depending on the characteristics of the products, so for the sake of making the product competitive constant efforts must be earnestly made so as to develop speciality products and to further enlarge the quantity produced.

(3) Establishment of Selling Routes

With a view to stabilizing their managemnt, it is mandatory to increase the value and the quantity of the products marketed. However, in the case of edible wild plants, they are a natural resource that is relatively easy to collect, and require no complex techniques in their primary processing, so it is easy to participate in the market as competitors. These factors lead often to a situation where additive value can not be maximized, making sales and transactions unstable.

In such a situation, in the interest of planning for the stability of business conditions, the followings are also of great importance: ① Processing facilities should strive to improve quality and enhance confidence in the products, ② they should develop and advertise distinctive speciality products, ③ they should insure that the supply of their products is stable quantitatively.

(4) Maintenance of Excellent Management

Though the author has examined the salient features of the processing facilities for

edible wild plants, the actual conditions manifesting themselves at any one facility will depend on the organic combination of all the discrete features together. And for the purposes of their organic manifestation, capable management is required by people of ability. To this end it is indispensable that assistance be provided by the governmental authorities for the respective regions.

Literature Cited

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要　　約

自然食品ブームが高まるなかで，北海道では，山村地域の産業振興策の一つとして，1970年頃から国などの補助事業により山菜加工施設が数多く設立された。しかし，山菜資源は豊富であっても，その採取時期が季節的に限定されること，商品の販路が不安定であること，などにより，その経営は必ずしも成功しているとはいえない状況にある。

本稿は，山菜生産の発展方向を探るため，北海道における販売用としての山菜の生産とその加工施設の動向について検討し，山菜加工施設の成立条件を考察したものである。

山菜加工施設の経営安定のためには，その地域における山菜資源の豊富な存在が前提となるが，あわせてその資源を採取するための労働組織および原料の効率的な集荷体制を確立することが重要である。また加工施設は，資源の現存量や生産計画に適合した規模にするとともに，原料の集荷および貯蔵，加工装置，製品の貯蔵及び出荷施設を合理的に配置することが重要である。さらに経営の安定のためには安定した量的取引きが必要である。そのためには品質の向上，特徴ある商品の開発と宣伝，商品の量的安定供給を図ること，さらには地域の行政当局による支援体制の確立が重要である。