VII. VEGETABLES

General Characteristics

Before the 1950s, only a few Tibetans could afford to eat vegetables in the Tibetan Plateau. Brassicaerapa, Chinese cabbage, rape, radish (Raphanus sativus) and broad bean (Vicia faba) were commonly grown in the study area, but the Tibetan people were not accustomed to eat vegetables.

Because of the introduction of vegetable species from other regions especially from eastern China since the 1950s, the area under vegetables has expanded, and the total production has increased. The demand for vegetables has also increased due to population growth and dietary changes by some Tibetans.

Table 15: Vegetable Cultivation Area and Relative Importance by Prefectures (1985)

Place	Area Cultivated ha	Relative Proportion %
Lhasa Prefec.	400	
Lhasa	100	25.0
Nyingchi	107	26.7
Shannan P.	727	
Gonggar	307	42.2
Nedong	240	33.0
Xigaze P.	633	
Gyangze	327	51.6
Namling	80	12.6

Most of the vegetables are cultivated in broad valleys and basins on the northern side of the Himalayas, the middle reaches of the Yarlung Zangbo River, dry valleys and broad basins in the Hengduan Mountains, as well as on the southern flanks of the Himalayas and in Zayu district. Lhasa, Xigaze, Gyangze, Gonggar, Zetang and Nyingchi, located in the middle reaches of the

Yarlung Zangbo River and its tributaries, are the major cities and towns. Owing to the increasing demand for vegetables, the cultivated area has expanded and now abounds in vegetable varieties. The vegetable area and its proportion to the respective prefectures are shown in the Table 15.

The area distributed under various management systems is shown in Table 16.

Table 16: Vegetable Area under Various Management Systems, 1981
(in ha)

Area	Total	State	Collective	Enterprise	Individual
Tibet total	7594	53	5020	127	2393
Lhasa Prefec.	1087	7	173	80	827
Shannan P.	1193	-	107	13	1073
Qamdo Prefec.	4613	7	4287	-	320

Vegetable Crops

The species distribution of vegetables depends mainly upon the ecological requirements and the physical environment, such as temperature. A number of vegetables with cool temperature resistance are extensively distributed in the study area.

The important cultivated vegetables are listed in Table 17, together with their distribution limits.

Table 17: Principal Vegetables and Their Upper Elevation Limits of Cultivation

Common Name (m)	Principal General/Species	Upper-limit of Elevation (m)
Cole crop	Bassica oleracea	
Chinese cabbage	Brassica pekinensis	4700
Radish	Raphanus sativus	4700
Turnip	Brassica rapa	4700
Carrot	Daucus carota	4150
Spinach	Spinacia oleracea	4700
Lettuce	Lectuca sativa	4150
Celery	Apium graveolens	3900
Tomato	Lycopersicon esculentum	4000
Eggplant	Solanum melongena	4000
Garlic	Allium sativum	4600
Welsh onion	Allium fistulosum	4260
Chinese chive	Allium tuberosum	3900
Pepper	Caspicum annum	4000
Bottle gourd	Lagnaria siceraria	3900
String bean	Vigna sinensis	3900
Lablab bean	Dolichos lablab	4150

Turnip (Brassica rapa)

Turnip is extensively distributed on the northern side of the Himalayas with its higher limit in Tibet. It is a cold-resistant crop with a short growing period and a high yield even when subjected to low temperatures and freezing. Owing to its lower economic value, the area under turnip cultivation accounts for 4,567 ha. with a total yield of 3,505 tons according to a rough estimate in 1981. Turnip cultivation area accounted for some 3 per cent of the total cultivated area in the 1960s, while in 1984 it was 2.4 per cent.

In Tibet the turnip is usually used as food, vegetable and as fodder.

Rape

Rape, a cruciferous oil plant, is cold-resistant. It begins to germinate at 2°C, and its shoots can tolerate early frost of -3 to -5°C. The optimum temperature for good germination is 20°C. Good yield of rape can be achieved on fertile soil with a permeable top layer. The moisture requirement varies between different species and different growing stages; for example, winter rape requires higher moisture, and the need is especially great during the blossoming and seed formation periods.

In Tibet, the physical environment is suitable in many areas for rape cultivation. From Medog, at an elevation of several hundred metres, to Gyangze 4630 m high, rape cultivation is widely found. Though not as cold-resistant as naked barley and wheat, it has a short growing season (100-150 days), therefore, it is most commonly sown in the valleys of the Yarlung Zangbo River and its tributaries, the valleys of the Hengduan Mountains and on the southern flank of the Himalayas.

Due to the high content of protein, rape oil is nutritious. However, it is not in great demand by Tibetan people who are unused to it. The cultivation area therefore, did not expand very fast, its proportion in the total cultivation area remaining at about 4-5 per cent.

Rape is good for rotation and to enrich the soil, so it is often mixed with naked barley, wheat and broad bean. As a green manure crop with short nutrient growing period and high biomass of green herbage, it is also widely planted. The advantage of rape manure cultivation lies in that the seeds can be provided locally, and that is more easily planted in rotation than perennials because it is a short-season crop.

In Tibet, over 10,700 ha. of rape is cultivated, with an average production of 1200 kg/ha in 1985. On experimental fields in Gyangze farm, the yield in 1978 reached 5088 kg/ha, and an even higher production of 6,167 kg/ha was achieved in 1979 in experiments done by the Agricultural Research Institute of the Autonomous Region. These facts indicate that rape has great production potential in Tibet, and a rape production base is likely to be set up in the future.

Cultivation Techniques

The following techniques should be applied in rape cultivation.

Field Processing

Field preparation is strictly required for rape cultivation because of the smallness of rape seeds and the depth of penetration by rape roots. For example, the tillage layer should be made thicker, and the soil texture finer.

Proper ways of fertilization

Rape has a high requirement for fertilizers, the most necessary being the nitrogenous type followed by phosphoric and potassium fertilizers. In the early growing stages, a small amount of fertilizer is demanded due to the slow growth, while in the following budding and flowering period, much more

fertilizer is needed to promote ramifying, bearing and maturing. Because of the low speed of nutrients discharged under the low temperatures, in order to make the fertilizers available in time, basal dressing is recommended, accompanied by additional fertilizing with quick-acting fertilizers before the flowering season.

Planting at the proper time

The main rape varieties in Tibet are Nianhe No. 1 and Qushui big-seed, which are middle or late maturing. Early planting is suitable from late March to early April. The seed planted should be about 15 kg/ha when spraying, and less than 7.5 kg/ha when strip-planting or pit-planting. The local people usually mix cultivation of rape with broad beans because rape can raise not only its own production but also that of the accompanying broad bean, due to its nitrogen fixing capacity.

Rational condensed planting and final thinning

Rape planting density should be 75,000 per ha in mixed planting, 225,000 in single planting on fertile soil, and 300,000-450,000 in single planting on infertile soil. Thinning should be started when 3 to 4 euphylla have stretched out, and final thinning done when 5-6 euphylla are out. Earthing should also be followed after thinning the crops.

Harvesting in the optimum period

Optimum harvesting is important for rape production. Too early harvesting will result in immature seeds and low oil content, while too late would cause the seeds to drop off. The optimum harvesting time is indicated by 70-80 per cent of the plants and fruits turning yellow. Harvesting should be done in the early morning and evening, when moisture is relatively high, in order to reduce cracking of fruit and seeds dropping off.

The Management of Vegetable Farming

Conservatory cultivation of vegetables such as greenhouse. breeding ground, plastic film cover, and seedling transplant, are recommended to improve ecological conditions by increasing temperature, shortening the growing period and expanding the distribution of vegetables.

In the plateau, basins and broad valleys on the northern flanks of the Himalayas with an elevation of more than 3,500-4,000m above sea level, sunshine abounds for more than 36 hours. The effects of raising temperature in the conservatory are very obvious. Therefore, utilizing conservatory cultivation and transplanting the seedlings are key measures to enrich the species and varieties of vegetables, to expand their distribution, and meet the demands of population growth and economic development.

Lhasa and Xigaze are located in the valleys of the Yarlung Zangbo river, and Tingri and Saga on the plateau region with an altitude of 4,650m above sea level. Many vegetables which prefer warmer temperatures, such as tomatoes, cucumbers and peppers are grown in greenhouses. In Lhasa district, fresh vegetables can be produced in greenhouses all year round without heating, e.g., cucumbers can be grown twice a year with yields reaching 30-60 ton/ha. In Yanbajing area, to utilize the thermal energy of the thermal power station, vegetable farming can be developed at an elevation of 4,200m.