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APPROPRIATE AGRICULTURE INTERNATIONAL CO., LTD
1-2-3-403 Haramachida, Machida, Tokyo, 194-0013 JAPAN.
TEL/FAX:+81-42-725-6250 Email: aai@koushu.co.jp

Dhofar Region in Oman and the counterparts of JICA Project

Dhofar is located in southern part of Oman, which occupies about one third of the country, and shares the border with Yemen. Thus, the culture and the race of Dhofar are influenced by Yemen strongly and are different from those of the northern part of Oman such as Muscat. In 1960s, people in the mountain area stood up for independence and fought a battle with the present government. However, criticisms against the government are hardly heard at present, because Sultan Qabus gives economical support to them. The region is now very peaceful and stable.

The Dhofar Region can be classified into three parts according to the geographical features. The first one is "coast area" including Salalah, where agriculture and fisheries are the main industries. The second is "Jabal" consists of 1,000m high mountains in the north of the coast area, where livestock raising (cattle and goats) is prevailing. The third is "Nejd" in the north of Jabal, where camels have been grazed by nomads since old days. It drizzles in the coast area and Jabal from July to September under influence of south-west monsoon blowing from the Indian ocean. Because of this drizzle, these areas are covered with vegetation which are hardly seen in other parts of the Arabian Peninsula. On the other hand, temperature in Nejd rises over 45℃ and the air becomes extremely dry because of the foehn phenomenon caused by the monsoon blowing in across the mountains.

At NARS (Nejd Agriculture Research Station) in Nejd, ten young agricultural engineers are working as counterparts of a JICA project. They are expected to be driving forces in Oman in future. All of them are from the Dhofar Region, particularly from Salalah, Jabal and Nejd. Their ages vary between 20 and 25, which means only 1 to 3 years have passed since they graduated either from universities or high schools. The former Director was 25 years old and capable for the project management. He is a family member of the Shanfalus, an influential family in Salalah. At present, these counterparts are engaging in research works on development of arid land agriculture, which includes cultivation of fodder and vegetables, soil survey and other related analysis. (Reported by Zaitsu from Oman)

The Director and Badar (Salalah)

Bakhit (Jabal)

Mohamed and Salem (Nejd)

Agriculture and irrigation in arid lands : From a viewpoint of sustainability

Part 1 : Irrigated agriculture in arid lands

The irrigated agriculture which utilize river or groundwater are often introduced to arid lands because of the scarcity of annual rainfall. In case of Pakistan in West Asia, irrigation facilities which can utilize abundant water of Indus river have been constructed since the colonial period and vast areas have been irrigated. However, excess irrigation has been causing problems such as water logging and salt accumulation in the soil. Similar problems are reported in Syria as well. In UAE in the Arabian Peninsula, agricultural and/or afforestation projects which seems more or less environmentally unconscious have been implemented with abundant oil money. These projects are causing deterioration of water quality, drying up of groundwater and salt accumulation in the soil due to inadequate irrigation with saline water. Thus, it is urgently needed to plan and implement appropriate projects in terms of scale and level with nationwide viewpoint.

As mentioned above, problems like salt accumulation are often caused by irrigated agriculture in arid lands, and two methods seem to be effective to avoid those problems. One is to irrigate adequate amount of water, and the other is to drain the excess water away. However, when the scale of irrigation facility or organization is very large, it is rather difficult to control the amount of water provided to each farmer properly and timely. As a result, farmers are apt to irrigate excessively when water is available. This is understandable because, in arid lands, crops easily die without irrigation and grow better when irrigated with more water. As long as such situation continues, it would be almost meaningless if agriculture extension officers and experts of aid organizations intend to train farmers how and when to be irrigated. These problems can be solved if farmers can use enough water whenever they want, which means irrigation facilities should not be too large so that farmers can control them by themselves.

When irrigated agriculture is newly introduced to arid lands, irrigation using well or river water is generally adopted. But, before the modern irrigated agriculture, usually they have traditional cultivation practices even in such arid areas. "Water harvesting" which makes use of scarce rainfall is one of them. And "Oasis agriculture" which often uses underground canals is another traditional way in arid lands. Compared to the modern agriculture, crop yield with traditional way is unstable and poor. However, in terms of sustainability, traditional practices are more advantageous than the modern ones which tend to cause problems such as salt accumulation within a relatively short period. On the contrary, traditional practices have been used for a long time and causing few problems, which proves that the practices suit the climate and other conditions of the areas and conserve the environment. Thus, when we engage agricultural development in arid lands, it is indispensable to study traditional cultivation practices carefully.

Salt accumulation (Pakistan)

Oasis agriculture (UAE)

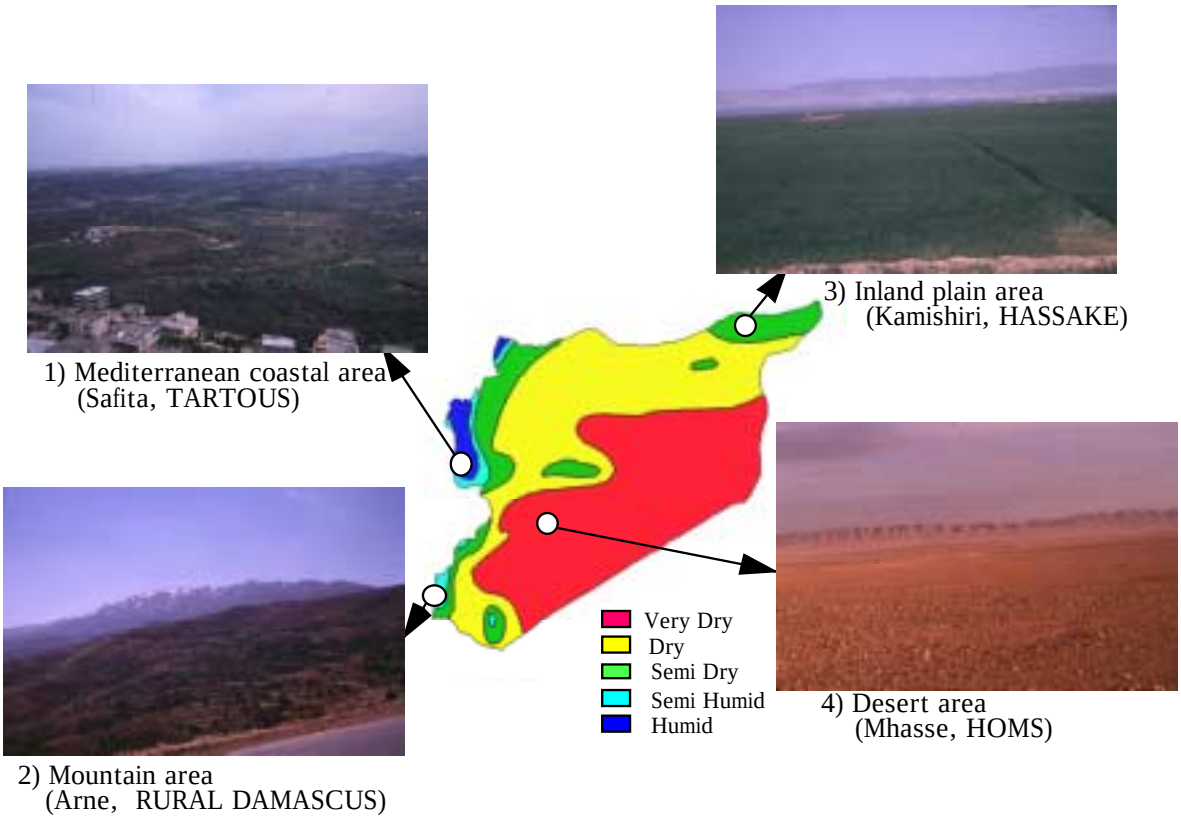
Nature and Agriculture in Syria

Part 1 : Varied Climates of Syria

Syria is located in northern part of the Middle East, in latitude between 32˚ and 37˚ north and longitude between 35˚ and 42˚ east. The area covers about 1,850,000k ㎡, almost half of Japan, but their topography and climate are full of variety. The Mediterranean coast area has plain coast of 180km long and 20-30km wide, and mountains parallel to the coast. The weather is temperate and cultivation of citrus fruits and greenhouse vegetables are popular. The Mediterranean mountain area consists of steep mountains stretching from south to north. Some of the mountains such as Jabal Sheikh in south west of Damascus reaches up to 2,800m above the sea level. It snows in winter and annual precipitation is more than 1,000mm. Apples are produced on the mountains. In inland plain area, the "Fertile Crescent" spreads from east side of the mountains along the border with Turkey. Rainfall in winter, high temperature and dry weather in summer make this area an important grain producing zone. The desert called "Badia" spreads in south-east, and occupies more than 40% of the country.

Agriculture is one of the main industry in Syria. Agricultural products are very important not only for domestic consumption but also for export. The basic problems of Syrian agriculture are unstable production due to the cultivation practice solely depending on rainfall, and lack of infrastructure such as irrigation facilities. Moreover, as vast area of the country is semi-arid land, conservation of natural environment has to be put into serious consideration when development projects are planned. So-called "sustainable agriculture" should be more focused in order to solve problems such as soil erosion, salt accumulation and desertification, which are major common issues in arid and semi-arid areas.

In this series, we would like to divide Syria into four areas according to the climatic features and introduce cultivation practices of each area, environmental problems and their trials which seem to be effective for sustainable agriculture.



Plants in Arid Lands and Their Utilization (7)

We have been describing about the relationship between natural vegetation and topography around Al Ain in UAE. Our objectives are to study the vegetation as indicator plants which can give us various information such as the characteristics of soils or groundwater of the area, which could be useful to select appropriate land/area for afforestation or agricultural development. The summary of the results is shown in a table below.

Topography	Major vegetation	Characteristics	Conditions	Land Use
Mountains	*Zizyphus spina-christi*	Xerophyte, Edible fruits	Steep slope, Rocky plain	None
	Acacia tortilis	Fodder		Dates farm
Alluvial fan	*Hammada elegans*		Plain, Deep ground-water (top of the fan) Fine soils (end of the fan)	Farm, Afforestation, Urban area, Oasis
	Rhazya stricta	Weak against saline water		
Dunes	*Cyperus conglomeratus*	Fodder, long root	Even-grained sand with some moisture	None
	Hammada elegans			Grazing
Interdunal Plain	*Zygophyllum hamience*	Halophyte	Plain Fine soils	None
	Prosopis cineraria	Fodder		Afforestation
Sabkha Coast area	*Salsola baryosma*	Halophyte	Plain Saline soils	None
	Avicennia marina	Halophyte, Fodder		Fisheries

The field observation indicates the relationship between vegetation and land use as follows;

1) The area where Acacia tortilis grows is not used for farming and left wild.
2) Prosopis cineraria grows near farmland.
3) Rhazya stricta grows on gravel fields where other vegetation is hardly seen.
   Level of groundwater is deep.
4) Cyprus conglomeratus can be seen only in dunes. Camels are often grazed in the area.
5) Interdunal plains are suitable only for afforestation. Hammada elegans are often seen.

From the information above, we can bring out the following conclusions.

1) The plain area where Prosopis cineraria grows could be suitable for agricultural development.
2) The area where lots of Acacia tortilis or Rhazya stricta grow is not appropriate for agriculture.
3) It is difficult to decide the place where Hammada elegans grows would suit for agriculture or not, however, it could be considered as afforestation area.

In order to select the site for agricultural development or afforestation, studies on topography, vegetation, soil, and groundwater are very important. Nowadays, remote sensing analysis has been very popular for this kind of study. It could be indispensable for successful project planning to formulate the plan based on such detailed studies. However, in some cases, the selection still depends on the indigenous knowledge which has been recognized by local people traditionally. They have their own indicator plants to judge the environment. The method which we described in this series is rather rough, however, it is simple and easy to adopt, so it could be useful as a land classification method, specially for local farmers. To improve the method, we should conduct additional examinations such as; 1) to check the level of groundwater and the taste of well water, 2) to observe soil profile, and 3) to ask farmers how they select the site for agriculture.

Now we have our staff in Syria, Pakistan, or Oman, and we would like to continue this kind of study in those countries as well. At the same time, we would like to conduct more detailed study on soil and vegetation of certain area. Conjunctive use of traditional method and modern technologies such as remote sensing analysis could be effective to classify the land more appropriately.