<<No.2>> December 1, 1997

AAINews

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Land of Frankincense - Dhofar

Dhofar region in Oman is famous for producing high quality frankincense. According to some articles, local people call the trees from which frankincense have been produced "Magarah" and the ones from which frankincense have not been produced "El teys". The Producing district of frankincense is located on the slope of the seacoast near Yemen and the area covers 300km (east-west) x 70km (south-north). Trees of frankincense grow very well under moderate humidity and lime soil and do not grow in dry area. Direct rainfall is not preferable, however mist or thick fog in the mountain seems necessary to obtain high quality frankincense.

Oman and its surroundings

Maximum height of the trees is about 3m and the shape looks like a fan, similar to Acacia tortilis. Leaves start growing in May or June. A leaf is 5-10cm in length, and has the shape similar to a radish leaf curled due to disease. Leaves also have slight fragrance.

The quality is different by area and classified into 4grades. (Grade 1 is the best and the restfollows in order.)

1) El Hojari (east area) 2) El Najdi (north & Central mountain area)
3) El Shazri (west & rainfall area) 4) El Shabi (coast & valley area)

In El Hojari, the best frankincense is produced mainly at Hojar and Samhan on Sadar Mountain, in east of Salalah, where a lot of frankincense trees are planted.

At harvest time in April, various positions on the trees are cut and the resin is collected from those cuts. Nowadays resins are sold in towns in the area, but they used to be all exported by ships.

A tree of frankincense (Boswellia sacra)

Qara mountain in Dhofar region

Kind of Tree-planting Activities in United Arab Emirates

Part 2 : Plant species used

(1) Urban greening

Main species used for urban greening are categorized by their utilization as summarized below.

Species for road side planting
- Phoenix dactylifera
- Melia azadirachta
- Albizzia lebbeck
- Eucalyptus spp.
- Ficus religiosa, F. benghalensis

Species for fences
- Clerodendron inerme
- Vitex negundo
- Bougainvillea glabra
- Sesbania aegyptiaca

Species for median strips
- Hibiscus rosasinensis
- Tecoma stans
- Euphorbia pulcherrima

Species for covering grounds
- Cynodon dactylon
- Ipomea pescaprae R.

Halophytes
- Acacia spp.
- Salvadora persica
- Prosopis spp.

* Data was collected from Gardening Section of Al Ain Municipality

(2) Large scale afforestation

In 1970's, species adopted for large scale afforestation were mostly foreign varieties, such as Eucalyptus spp., Acacia spp., Casuarina spp., Prosopis juliflora, etc. After that, local xerophytes or halophytes, which require less water for growth such as Prosopis cineraria, Acacia ehrenbergiana Acacia arabica, increased its share in afforestation.

Afforestation along the Al Ain-Abu Dhabi road

Afforestation of Salvadora persica

These days local varieties occupy 90% of the species for afforestation. Since 1977, local shrubs such as Calligonum comosum and Leptadenia pyrotechnica, and foreign shrubs such as Atriplex spp; have been planted between major trees. They will be utilized for feeding animals in the future. Demand for Salvadora persica is increasing in the area where irrigation water is saline. Moreover, wild species such as Hammada elegans, Zygophyllum spp. are growing naturally inside afforestation area. At present 6 species, mainly local species, are adopted for afforestation; Prosopis cineraria (Ghaff), Acacia tortilis (Samar), Zizyphus spina-christi (Sidder), Salvadora persica (Arak), Leptadenia pyrotechnica (Murkh), Acacia ehrenbergiana (Salam).

You can do it! Remote Sensing Analysis

Part 2: Sensors on the Satellites and the Contents of the Data

(1) How accurate is remote sensing analysis ?

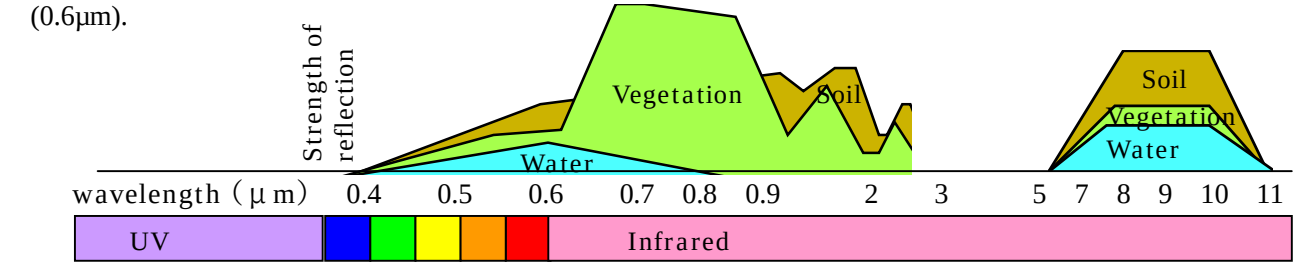
Satellites are flying over 500km away from the ground. Although accuracy of sensors are improving gradually, the minimum resolution of the most sensitive sensor is 10m. The data we can usually obtain is less accurate, the minimum resolution is 20-80m. As a result, it is impossible to analyze an object smaller than that, such as a flower in a small garden. Let us hope for innovations of the technology in the future.

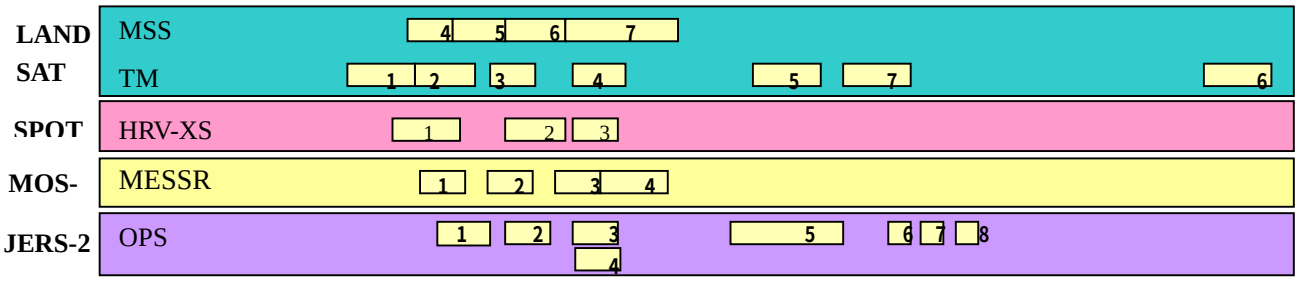
Satelite		Band	Resolution (m)	Operation
Landsat (TM)	USA	7	30m	1988
Landsat (MSS)	USA	4	80m	1972
SPOT	FRS	3	20m	1986
JERS-1	JPN	8	20m	1992
(Fuyo No.1)	SAR*			
MOS-1 (Momo-No.1)	JPN	4	50m	1990

SAR: Synthetic Apeture Raer

(2) What are the contents of the data ?

We human beings recognize colors of objects by their reflection of light called visible light. Sensors on the satellites distinguish colors completely differently. As shown below, each sensor detects reflection of a specific wavelength zone and records the data numerically by classifying the strength of the reflection into 256 grades. Wavelength to be used is specified according to the purpose of research. For example, when water is the object of a research, the data taken by the sensor best fits for the wavelength zone of water should be used (0.6μm).





	TM		MSS		SPOT		MOS-1		JERS-1		
	B-range		B-range		B-range		B-range		B-range		DISTINCTION
Visible (B-G)	1	0.45-0.52									Deciduous trees/ conifers
Visible (G)	2	0.25-0.60	4	0.5-0.6	1	0.50-0.59	1	0.15-0.59	1	0.52-0.60	Plant vigor index
							2	0.61-0.69	2	0.63-0.69	
Visible (R)	3	0.63-0.69	5	0.6-0.7	2	0.61-0.68	3	0.72-0.80	3	0.76-0.8	Distinction of plants
									4	0.76-0.86	
Near infrared	4	076-0.90	6	0.7-0.8	3	0.79-0.89	4	0.80-1.10			Distinction of sea and land Identification of plants mass
Intermediate infrared	5	1.55-1.75	7	0.8-1.1					5	1.60-1.71	Estimating ground surface moisture
	7	2.08-2.35							6	2.01-2.12	Distinction of sea and land
									7	2.13-2.25	
									8	2.27-2.40	
Thermal infrared	6	10.4-12.5									Estimating ground / sea surface temp.

Plants in Arid Lands and Their Utilization (2)

In the last issue, we wrote that rough rules between location and vegetation are recognizable around Al Ain, UAE. This time we would like to concentrate on mountain area and the main vegetation around the area. Most parts of the mountain area are steep, rocky and the soil is not fertile. Sparse vegetation of Acacia tortilis etc. can be recognized around the mountain and the gravel plain. Relatively long wadi and shallow gully run near the foot of mountains. Although water can be found occasionally only in winter season, there is no perennial flow. A. tortilis, Zizyphus spina-christi, Prosopis cineraria etc. grow around wadi in the mountain area.

Mountain area in Hatta

Wadi running in the mountain area (Masfut)

1）Acacia tortilis (Acacia raddiana)

Characteristics:

Widely distributed in Africa, India & Middle East. The leaf is compound leaf. It has long and strong spine.

Condition of growth:

Xerophyte. Annual precipitation under 100mm, alkaline soil, shallow soil layer, high temperature (up to 50℃).

Usage:

High quality firewood & charcoal, feed, fence, or forest against the sand.

Others: It is called umbrella tree for its shape.

2） Zizyphus spina-christi

Characteristics:

Widely distributed in Middle East, near the Mediterranean & South west Asia. The leaf is oval shape. There are short spines. Bear fruits of about 2cm in size.

Condition of growth:

Xerophyte. Annual precipitation under 100mm, high ground water table, alluvial soil, maximum temperature 50℃.

Usage: Fruits are edible & also used for feeding. It can be used as timber. Roots grow deeply and prevent erosion.

Others: It was the spine crown of Christ. Belongs to the same group of jujube tree of Japan.