828 Davis Rd., League City, TX 77573
Toll-free: 888-306-LAND (5263) **Phone:** 609-412-0555
info@landviser.com **Web:** www.landviser.com
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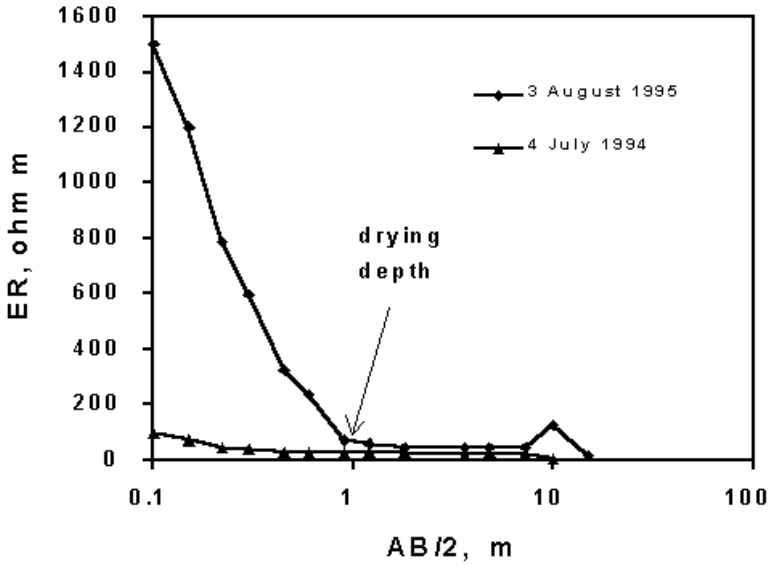
Vertical Electrical Sounding to detect peat deposit thickness and drying depth

The valley landscapes of humid areas are dominated with peat soils of various origins, which become the most productive soils after the proper drainage and cultivation. The high fertility and proximity to water make peat soils the most desirable for vegetable production. However, these soils are also subject to quick degradation during agricultural usage. Excess drainage increases the unproductive decomposition and mineralization of peat and can cause spontaneous ignition of peat soils, whereas little or no drainage can be non-sufficient for normal agricultural practices. Therefore, drainage design and the following agriculture practice on peat soils should be based on careful studies of the peat soil genesis and hydrology of the areas.

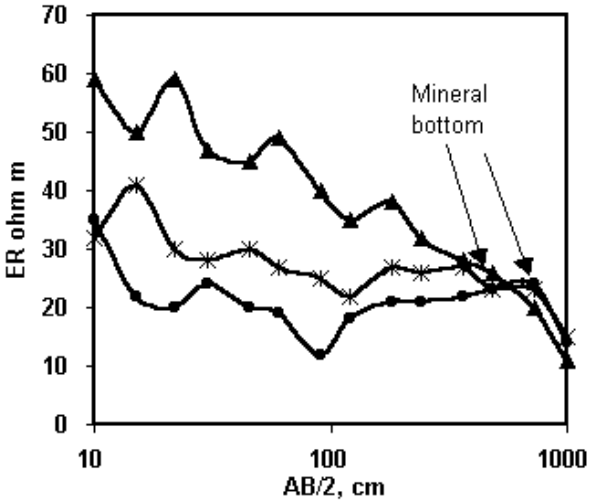


(Figure, VES for 4 July, 1994). In extremely dry years as in the summer of 1995 in Moscow area, Russia, the upper 50-cm layer of peat soil dried almost to the wilting point, causing an increase of electrical resistivity up to 1,500 ohm m. The drying depth was precisely determined with the VES interpretation. The estimation of drying depth with computer interpretation of VES was verified with direct water content measurements in soil samples collected from the different soil layers.

However, the resistivity of a peat soil and an under-laying mineral deposit are shown to be different regardless of the water content conditions of

http://www.landviser.net/content/vertical-electrical-sour drying-depth

Method VES is suitable for detection the resistivity in different soil and geological strata without digging or boring. Usually, peat shows not much difference in electrical properties along the profile. Water content of cultivated peat soils is close to the field capacity during the whole growing season. Other soil properties, such as bulk density, texture, and ash content, that might influence electrical resistivity, are also practically uniform in the soil profile. Therefore, a typical electrical resistivity distribution in the profile of cultivated peat soil (Hemic Haplosaprist) is uniform and about 40 ohm m at the soil surface during the years with average precipitation



the soil. VES curves of cultivated peat soil on field 8 of CPBRS indicate some decrease of resistivity at AB/2 greater than 1000 m (Figure on the right). This particular area of peat soils is underlined by clay glacial till and lake sediments, which are enriched with colloids and have small electrical resistivity. If peat soils are underlined by a coarse sand material, the difference in electrical resistivity between peat soil and sand deposit might be less pronounced. The interpretation of VES measurements shown, that the depth of peat can be estimated with accuracy about 8.6% if peat is underlined by clay, loam or stony mineral layers (Table).

Table. Estimation of peat soil depth with VES method.

Location	Depth of peat		Relative estimation error
	Real (Bore-hole)	Estimated (VES)	
	cm		%
11	**488**	**432**	**11.5**
7	**333**	**300**	**9.9**
6	**173**	**163**	**5.8**
5	**113**	**102**	**9.7**
4	**290**	**272**	**6.2**
Mean			**8.6**

Thus, the thickness of the peat and the drying depth of peat soil were measured with VES method. The estimated soil properties are essential for the sustainable management of peat valley soils in intensive vegetable production.