GOOD SEEDS DON'T JUST HAPPEN

by
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In Israel there are two major potato growing seasons. In the first season, seed tubers imported from northern Europe are planted in February and harvested in June. The second season is in the autumn with planting during August and harvesting in December-January. The seed stocks for the autumn planting are obtained from early liftings of the spring season.

During the past five years, there has been a massive national effort to grow potato seed tubers in the Galan Height (el. 3000 ft.). The region has deep volcanic soils and European weather conditions. Seed tubers are planted there in May, harvested in September and kept in cold storage at a controlled temperature of 2-4°C for planting in the Negev the following season in February. The Golan Height crop is expected to replace 20-30% of our imported seed tubers.

If seed tubers are produced in fields infested by soil-borne pathogenic fungi or bacteria, they are usually infected by the organism; in addition because the tuber is anatomically a stem, the vegetative procedure of progation will cause transmission of viral infection to the next generation. We believe that most of the aforementioned infections arrive in seed material contaminated by prior crops even if the infection occurred several years previously.

The cost of potato production in Israel is very high because water is expensive, therefore, it is essential to avoid yield reduction, mainly by planting healthy tubers. To achieve this, the following measures are employed:

A) All potato seed tubers (mainly imported) must be treated by organic Mercury and Terachlor (new regulation passed in 1983).

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B) Fields designated for seed production are fumigated with Methyl Bromide or Vapam. During the last three years we have developed a method for mapping potato fields for V. dahliae infestation in the soil. Inoculum potential in soil samples (10-20/ha) was determined by a baiting technique using eggplants or flax as a susceptible host. An alternative technique used was based on monitoring visual Verticillium symptoms on susceptible crops (usually cotton) grown prior to potato. Figures 1 and 2 demonstrate two different Verticillium dahliae inoculum potential maps made by the above techniques in the Plant Disease Diagnostic Laboratory (PDDL) in the Gilat Experiment Station. Based on the information on nematode levels and infection rates of different seed lots, a better decision can be made on the necessity for expensive fumigation.

C) A seed certification scheme for viral, bacterial and fungal infection is performed by field inspectors. Since there is no correlation between infection rate in the tuber and visual infection in the foliage in some diseases, potato seed stocks (imported and domestic) are sampled and monitored for eleven diseases at the PDDL in Gilat. Table 1 presents the list of the examined diseases.

Infected potato seed stocks are not used for seed tubers, neither in domestic use nor for export. Figure 3 demonstrates the distribution of Erwinia spp., the causal agent of blackleg and tuber rot on potato in the 1967 imported potato seed lots from Europe.

By taking all these precautions, we have been able to produce better seed potatoes and to reduce yield losses due to disease. The quality of seed is thus judged not only by its physiological status but also by its freedom from disease. At this point the interaction between production controls and scientific problem solving has made a major contribution to the development of good seed potatoes in Israel.

Figure 1. Field mapping for V. dahliae inoculum potential in soil, made in Kibbutz Sole-Boker, Negev, Israel. Each square represents 1/4 acre ($1000m^2$). Two split samples were taken from each $1000m^2$ and monitored by the baiting technique using eggplant as a susceptible host.

■ Infested area. □ Non-detectable V. dahliae in the soil samples.

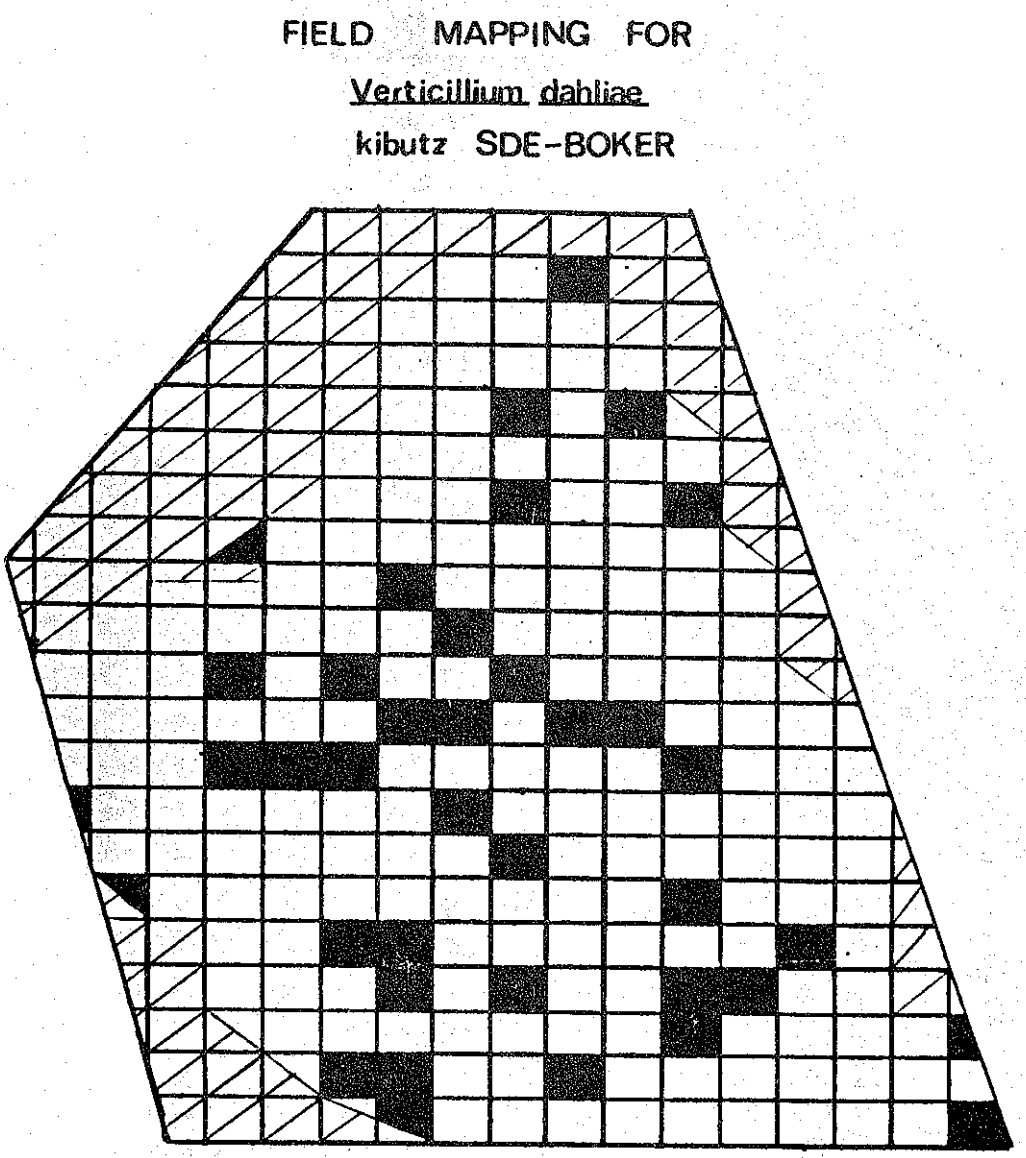

Figure 2. Field mapping for V. dahliae inoculum potential in soil, made in Kibbutz Kisufim, Negev, Israel. Each square represents 1/4 acre (1000m^2). Verticillium dahliae inoculum potential was carried out by monitoring specific Verticillium wilt symptoms on 5 stems of cotton (cultivar Acala SJ-2) at the end of the growing season prior to potato crop.

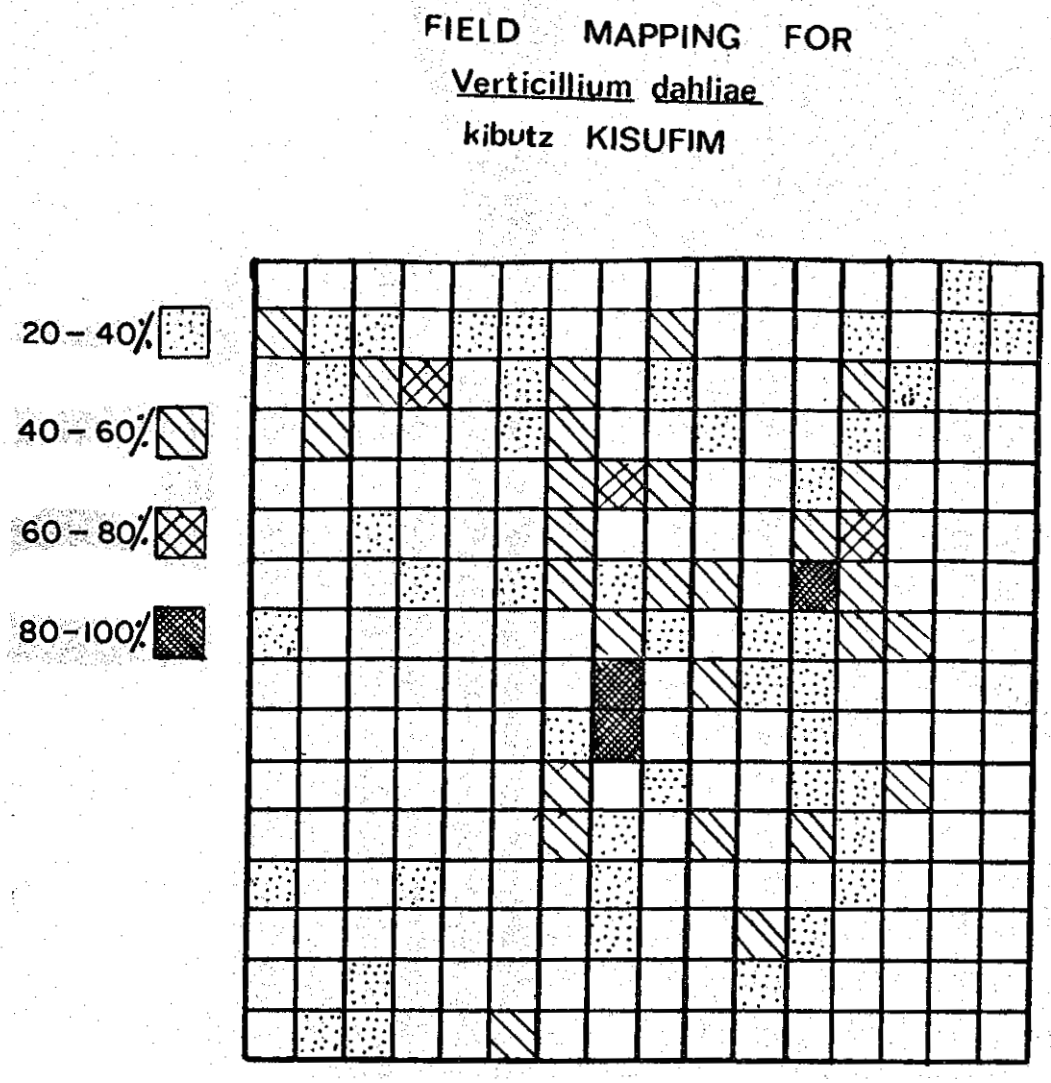

Table 1.

POTATO SEED-BORNE DISEASES MONITORED IN GILAT

	PATHOGEN	METHOD OF DIAGNOSIS	
1.	*Fusarium* COMPLEX	ISOLATION	3 DAYS
2.	*Verticillium dahliae*	ISOLATION	10 DAYS
		SEROLOGICAL	OR 1 DAY
3.	*Alternaria solani*	ISOLATION	3 DAYS
4.	PYTHIUM	MOIST CHAMBER	24 HOURS
5.	*Phytophthora infestans*	MOIST CHAMBER	24 HOURS
6.	*Rhizoctonia solani*	VISUAL	IMMEDIATE
7.	*Streptomyces scabies* (COMMON SCAB)	VISUAL	IMMEDIATE
8.	*Streptomyces* spp. (DEEP PITTED SCAB)	VISUAL	IMMEDIATE
		ISOLATION AND INOCULATION	OR 3-4 WEEKS
9.	*Spongospora subteanea* (POWDERY SCAB)	VISUAL MICROSCOPY	IMMEDIATE
10.	*Helminthosporium solani*	VISUAL	IMMEDIATE
11.	*Erwinia* COMPLEX (BLACKLEG AND SOFT ROT)	ISOLATION AND TEMP	3-4 DAYS

Figure 3. The distribution of Erwinia spp. on 1967 imported potato seed tuber lots from Europe. Infection was determined by isolating the bacteria from peeling material on CVP medium and incubation in 28° for 36 hours.