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This Week's Citation Classic

Nash S M & Snyder W C. Quantitative estimations by plate counts of propagules of the bean root rot fusarium in field soils. *Phytopathology* 52:567-72, 1962.
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A simple, reliable plate count method, devised to isolate and enumerate propagules of the bean root rot fusarium in field soils, indicated an even distribution of the pathogen in bean fields and that even though disease severity decreased after a grain crop, populations of the pathogen had, in fact, increased. [The *SCI*® indicates that this paper has been cited in over 170 publications since 1962.]

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"In 1956 the severity of soil-borne diseases in relation to crop sequence and residues became especially interesting to phytopathologists who recognized the increasing importance of crop losses due to soil-borne diseases. This cognizance was stimulated by the excellent treatments by Garrett,[1] who added new perspectives to the subject.

"W.C. (Bill) Snyder had studied genetics and taxonomy as well as pathology of fusaria with his colleague H.N. Hansen. He then became interested in pursuing the ecology of soil-borne fusaria. His friend Roy Bardin, plant pathologist for Monterey County, obliged by sharing his awareness of the fact that bean crops following mature barley crops were not vulnerable to fusarium root rot. Research was launched on this point, as Snyder encouraged his graduate students to investigate bean root rot in the Salinas Valley. Funding soon became available, the first being a federal grant (W-38) for studying effects of crop residues on diseases. As a graduate student and part-time lab technician of Snyder, I 'got on' the project at the beginning and along with graduate students Theodosius Christou, Nabih El-Gholl, Eduardo Trujillo, and T.A. Toussoun, who was just completing his thesis on fusarium rot of squash, we laid the groundwork in ecology of the bean root rot fusarium in soil. Then others joined in. At first we tried disease control by incorporating into the bean soil barley straw which had been colonized with antagonistic microbes. This procedure worked well in the greenhouse, but it utterly failed in the field. Taking another direction, we soon found that soil-borne fusaria exist as discrete units, chlamydospores or clumps of chlamydospores,[2] which could be amenable to enumeration and infection cycle studies. Chlamydospores of *Fusarium solani* f. sp. *solani* germinated readily near bean roots, but did not germinate readily in soil that was merely moistened. It was also found that *F. solani* f. sp. *phaseoli* field inoculum consisted of a multiplicity of clonal types,[3] and Trujillo could distinguish all clones of this pathogen from other soil fusaria on his 'modified Martin's medium.' With more modifications in selective media, improvements in dilution and sampling, we were able to establish quantitative information on field population levels of this pathogen in relation to disease potential, cropping sequence, and fertilization regimes. I think our paper is often cited because it encouraged others to quantify inoculum levels of soil-borne pathogens.

"With support from Snyder and Hansen, I pursued a PhD degree, the data on the bean root rot fusarium being used in part to fulfill the requirement. At that time women plant pathologists were sparse in the US, notwithstanding that this wasn't necessarily true elsewhere. (In a few countries women dominated the field.) Most of my peers welcomed me to the profession, but some expressed doubts that women were 'competitive enough' to succeed in 'a man's field,' one even saying that 'women do not possess sufficient logic for science.' However, I received encouragement from most, and became the first woman PhD recipient in plant pathology at Berkeley. Others soon followed.

"Fusarium root rot of bean has long been studied at several centers, including such universities as Cornell, where the disease was first described by Burkholder;[4] Michigan State; Wisconsin; and Nebraska, and also by USDA scientists, such as Doug Burke and his colleagues in Prosser, Washington, who continue to develop innovative and practical disease control measures. Most recently the work has been reviewed by Kraft, Burke, and Haglund[5] as a chapter in a book on fusarium."

1. **Garrett S D.** *Biology of root-infecting fungi.* Cambridge: Cambridge University Press, 1956. 292 p.
2. **Nash S M, Christou T & Snyder W C.** Existence of Fusarium solani f. phaseoli as chlamydospores in soil. *Phytopathology* 51:308-12, 1961.
3. **Snyder W C, Nash S M & Trujillo E E.** Multiple clonal types of Fusarium solani phaseoli in field soil. *Phytopathology* 49:310-12, 1959.
4. **Burkholder W H.** The dry root rot of the bean. *NY (Cornell) Agr. Exp. Sta. Mem.* 29:999-1033, 1919.
5. **Kraft J M, Burke D W & Haglund W A.** Fusarium diseases of beans, peas and lentils. (Nelson P E, Toussoun T A & Cook R J, eds.) *Fusarium: diseases, biology, and taxonomy.* University Park, PA: Pennsylvania State University Press, 1981. p. 142-56.