

# Salmonella Survey of Plant Foods Used in and Around the Home<sup>1</sup>

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Nine of 100 plant food samples investigated yielded salmonellae. A brilliant green tetrathionate-brilliant green agar combination gave the most salmonellae recoveries.

Recent information on salmonellae-contaminated materials has come from workers who observed the organisms in fertilizers and their ingredients (2, 5, 8, 9). Plant foods or soil conditioners, or both, are possible sources of infection in unexplained animal and human outbreaks.

We attempted to isolate salmonellae from 100 samples of a variety of soil conditioners, potting soils, manure, and plant foods available to consumers for use in and around the home. Triplicate sub-samples were processed and the products were then stored at room temperature for viability trials. Regardless of enrichment procedure, sample size was always 100 g suspended in 330 ml of enrichment broth.

For the first 30 samples examined, three methods were utilized: lactose broth pre-enrichment (LB; 7), direct selective enrichments in both tetrathionate broth containing a 1 to 100,000 dilution of brilliant green (BGTET), and dulcitol selenite enrichment (DSE; H. Raj and J. Liston, *Bacteriol. Proc.*, p. 3, 1965). LB cultures were subcultured in BGTET. All broth cultures were incubated at 37 C and plated on selective agar after 24, 48, and 72 hr. Brilliant green agar (BGA) and brilliant green sulfadiazine agar (3) were the plating media used. The final 70 samples were examined only with BGTET; also, 72 hr of incubation was omitted since it did not improve results. Secondary enrichment (4) in BGTET was used on all samples enriched in BGTET. Tergitol, as specified by Galton (3), was added to samples containing organic matter. Only EGA plating medium was used for the last 70 samples. Suspect salmonellae colonies were isolated on triple sugar

iron agar and biochemically tested by the method of Edwards and Ewing (1). Final serotyping of isolates was performed by the Laboratory Services, Kansas State Department of Health, Topeka.

Results are detailed in Table 1. It should be noted that an African-violet potting soil, ad-

TABLE 1. Type and number of samples examined, number yielding salmonellae, and *Salmonella* serotypes isolated from indicated samples

Type of sample	No. of samples examined	No. containing salmonellae	Serotypes isolated
Bone meal . . . . .	10	4	<i>S. meleagridis</i> <i>S. worthington</i> <i>S. fresno</i> <i>S. cerro</i> <i>S. cubana</i> <i>S. anatum</i>
Rose food . . . . .	5	3	<i>S. cerro</i> <i>S. meleagridis</i> <i>S. anatum</i>
Manure . . . . .	12	0	
Blood meal . . . . .	1	0	
Potting soils . . . . .	28	2	<i>S. cerro</i> <i>S. anatum</i>
Chemicals . . . . .	21	0	
Plant products . . . . .	17	0	
Bacterial inoculants . . . . .	4	0	
Fish emulsion . . . . .	2	0	
Total . . . . .	100	9	

vertised as a sterilized product, yielded salmonellae, and all the positive bone meal samples were "steamed" products. All positive samples contained some animal product as a constituent. The rose food contained bone meal and blood meal as part of its ingredients.

Lactose pre-enrichment greatly reduced the number of salmonellae-suspect colonies appear-

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ing on both plating media and gave no positive results. However, direct inoculation of both BGTET and DSE resulted in suitable inhibition of contaminants to allow growth of salmonellae. DSE was the most effective medium for suppressing the growth of contaminants, but it also reduced the number of salmonellae isolations.

Brilliant green tetrathionate in combination with BGA gave the best results of the enrichment methods used. Secondary enrichment of BGTET in BGTET facilitated salmonellae recovery.

Positive samples continued to yield viable salmonellae for at least 8 months after the initial isolations were made.

Our results confirm those of others (2, 5, 8, 9) who reported contaminated bone meal and fertilizers. Although heated bone meal has been reported free of salmonellae (8), we found salmonellae in "steamed" bone meal.

The possible hazard in storing these products in and around the home and in the mechanics of their use is obvious. Although only a few isolates from each positive sample were serotyped, most of those identified have been involved in food poisoning incidents and are often isolated from humans (6). Plant foods are possibly a source of infection for some of the unexplained incidents.

It appears that a majority of plant foods are uncontaminated, but those containing animal products, particularly bone meal, may contain salmonellae.

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