

## DAIRY MANURE STORAGE SITE EFFECTS ON WEED SEED VIABILITY

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Abstract: Dairy manure was sampled from various sites on dairies in Tulare County and Kings County to study the effect of manure source, feed quality, composting dairy manure, and the time of year, on weed species and populations. Manure samples were mixed with sterile soil and irrigated in green house conditions. The results for samples taken in winter of 1988 showed that three out of seven dairies had no viable weeds in samplings. Manure taken from dry cow pens had a much higher germination of weed seed than the milking cow pens indicating that the difference was largely due to the lower quality and weedier feed usually given to dry cows. Bristly foxtail and bermudagrass were the primary weeds. No weeds germinated from the composted manure.

Keywords Manure, weed seed, germination, composting, bermudagrass

### INTRODUCTION

Dairy manure has been an important soil amendment particularly when applied to less productive soils. Dairy manure however has a poor reputation among field crop growers as being a major source of weeds, therefore partly because of this its use is less popular than poultry manure or chemical fertilizers for the bulk of nitrogen and phosphate. Poultry manure is nearly weed free depending on how much soil and litter becomes mixed with it. Weeds are broken down by the grinding action of sand and gizzard. In ruminant animals many seeds pass through the digestive system and remain viable. The digestion system may loosen the seed coat of weeds with hard seed coats thus enhancing its germination. When manure is composted, weeds are killed from heat during the composting process.

It has been widely observed that dairymen often have weedier fields than farmers that typically don't use large quantities of dairy manure in their field crops. The reasons for this higher weed populations could be due to weeds in the manure, lack of composting, the manure providing an ideal growing environment, poor crop rotation practices, not using suitable herbicides, or a combination of all of these factors.

Before manure is applied to fields it is scraped and removed from several locations on the dairy. These locations include both unpled and piled manure in the milking corrals and dry cow corrals. Piled manure may be freshly scraped or composted one to two months inside or outside of the corrals. Manure is also scraped from sedimentation ponds, and in some cases from a sedimentation ramp or solids separator. This study was initiated to determine where the greater source of weeds were on the dairy, effect of feed quality, composting, and seasonal effects on weed seed germination and to identify the most prominent weeds.

In addition nitrogen, phosphorus, potassium, and total salts will be analyzed. This preliminary report is based on one winter sampling date. Eventually a report will be compiled with four sampling periods taken over a two year period.

### PROCEDURES

Manure samples were taken from six dairies in Tulare County and one in Kings County. An attempt was made to select dairies that would be typical of dairies in this region. Dairies ranged in size from 350 to 1500 cows and were categorized as traditional open corral with shades; these corrals plus dry cows having access to pasture; and freestall barn with corrals. The location varied from the far east side of valley to the northern and western borders of Tulare County.

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Samples were taken winter, spring, summer, and fall to observe the effect of temperature on weed seeds in manure and to encompass a wider weed spectrum. Samples were taken on several dairies for replications and to insure that as many treatments as possible are repeated. Several random samples were taken at the following sites:

- 1 Manure in corral (not piled). Milk cow pen
- 2 Manure in corral (not piled) Dry cow pen
- 3 Manure in corral (mounded 1-2 mo.)
  - A. 1 to 2 feet depth.
  - B. 2 to 4 feet depth.
  - C. 4 to 8 feet depth.
- 4 Manure mounded outside corral (1-2 mo.)
- 5 Fully composted 1-2 mo (turned) commercial
- 6 Sedimentation pond
- 7 Sedimentation ramp

Manure samples were oven and air dried then pulverized. The manure was spread out over the surface 1 1/2 to 2 inches thick in 18 x 18 inch flats. It was then mixed at 50% with a UC potting mix (vermiculite, peat, and sand). Flats were then irrigated to field capacity. Flats were watered 2 to 3 times per day depending on temperature. At 10 days the first weed seedling count was taken. The flats were left dry for one week, remixed, then watered again. A second weed seedling count was then taken. Weed seedling counts given in Tables 1-3 are an average of both counts.

#### RESULTS AND DISCUSSION

A summary of weed species that were germinated for the first samples taken in winter of 1988 are given in Table 1. Data for dairy type and site were combined. *Setaria* (bristly foxtail) and bermudagrass were the primary weeds found in the different sites.

Tables 1-3 demonstrated that manure taken from dry cow corrals had a much higher germination of weed seed than the milking cow corrals indicating that the difference was largely due to the lower quality and weedier feed usually given to dry cows. Manure taken from sedimentation ponds had about 50% more weeds in it than the high cow pens. At one site the sedimentation ramp was a source of weed seed. No weeds germinated from the dairy composted manure or commercial compost.

The corral plus pasture treatment exhibited by far the greatest number of weed seeds. At this dairy site dry cows roamed freely between a mixed bermudagrass pasture and corral. This may explain why weed numbers were much higher for the dry cow corral and sedimentation pond. The milk cow corrals were also higher at this site.

These results demonstrate that dairy manure can be a weed-free soil amendment if properly composted. If not, the reverse is true. Multiplying the number of weeds germinated per pound given in Table 2 by 2000 gives approximately 14,000 weeds per acre if one ton of dairy manure was applied using milk cow scrapings. There would be approximately 229,429 weeds per acre applied with every ton of manure from dry cow scrapings. Average application rates are about five to ten tons per acre.

These findings demonstrate the importance of weedy hay or feed as a contributor to weeds in manure. To be on the safe side manure from all sources on the dairy should be composted. If one was short on time, at least scrapings from the dry cow pens and sedimentation ponds should be composted.

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TABLE 1. WEED TYPES GERMINATED/WINTER MANURE SAMPLE, 1988

Dairy type Sample site*	Weed types			
	Barnyard	Seteria	Bermuda	Other
1. Open corral Milk cows	0	12	0	2
2. Freestall Milk cows	3	5	0	0
3. Open corral Dry cows	0	0	21	0
4. Freestall Dry cows	1	23	3	2
5. Pasture Dry cows	2	297	1	0
6. Sedimentation Pond/ramp	2	15	12	6
7. Farm compost	0	0	0	0
8. Commercial compost	0	0	0	0

\* Dairy type and site combined data

TABLE 2. WEEDS GERMINATED/WINTER MANURE SAMPLE, 1988

Dairy type	Cows in milk	Dry cows	Sedi. pond	Sedi. ramp	Farm compost	Comm. comp.
1. Open corral	2	21	1	--	0	--
2. Open corral	0	0	0	--	0	--
3. Open Corral	0	0	--	--	0	0
4. Coral + pasture	12	300	24	--	0	--
5. Freestalls	0	0	--	0	0	--
6. Freestalls	6	29	--	5	0	--
7. Freestalls	2	0	5	--	0	--
mean	3	50	8	3	0	0

TABLE 3. WEEDS GERMINATED/POUND DRY WINTER MANURE, 1988

Dairy type	Cows in milk	Dry cows	Sedi. pond	Sedi. ramp	Farm compost	Comm. comp.
1. Open corral	4	46	2	--	--	--
2. Open corral	0	0	0	--	--	--
3. Open Corral	0	0	--	--	0	0
4. Coral + pasture	26	661	53	--	--	--
5. Freestalls	0	0	--	0	--	--
6. Freestalls	16	96	--	10	--	--
7. Freestalls	4	0	11	--	--	--
mean	7	115	17	5	0	0