



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

AUG 11 1987

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: EPA Reg. No. 707-78. Mancozeb
Rohm and Haas letter of 7/13/87: Request for Definition
of Corn Silage.
(No MRID#) [RCB#2560]

FROM: Francis D. Griffith, Jr., Chemist
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THRU: Charles L. Trichilo, Chief
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TO: Lois Rossi (PM-16)
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Francis D. Griffith, Jr.
LR

The Rohm and Haas letter addresses several items relating to the Residue Chemistry Chapter of the Mancozeb Registration Standard. The Registration Division Data Review Record requests that RCB address that question in the letter which relates to a definition for corn silage. This RCB memo address only that question in the letter.

The Mancozeb Registration Standard requires Rohm and Haas to propose tolerances for mancozeb in corn silage. In their letter of July 13, 1987, signed J. Ollinger, the registrant agrees to generate the mancozeb and ETU residue data for corn silage this year then propose the appropriate tolerance based on field trial data. Prior to generating the residue data the registrant requests RCB define corn silage for residue-gathering purposes.

Background

In general silages are fermented forage plants. The ensiling process for corn can be 3 weeks long. It has a short initial aerobic phase followed by a longer anaerobic phase.

The aerobic phase starts when the green corn forage is cut then placed in a silo for storage. There must be sufficient moisture present to cause fermentation. Silos can come in any shape or size as long as they exclude air from the cut corn forage. For tower silos this includes entrance of air around the doors of the tower. The walls of the silo should be straight and smooth in order to prevent formation of air pockets and uneven packing. A silo should be packed within two days. The aerobic phase will continue until all of the oxygen is used up; CO₂ and heat are produced. In this short 1-2 day period aerobic molds/yeasts multiply.

The anaerobic phase starts when the oxygen is consumed and the acid-forming bacteria take over. The principal acids formed are lactic acid with some acetic acid. While the sugars in the "corn forage" are the principal plant constituents attacked, proteins are also broken down into ammonia and amino acids. This part of the process goes on for several weeks until a point is reached when the acidity is high enough to kill the anaerobic bacteria. At this point we have corn silage. The product can be a good animal feed for at least 15 years in the absence of air.

Types of Corn Silage

RCB recognizes there are four types of corn silages. These are ear corn silage, corn stover silage, shelled corn silage and whole corn plant silage. When RCB requests pesticide residue data on corn silage we mean residue data on the whole corn plant silage.

Preparation of Corn Silage

When to cut the whole corn plant for silage has bearing on the quality of the feed and magnitude of the residue. Harvesting the green corn forage at a proper stage of maturity is essential in making good silage. Corn forage is ready to cut for silage when the corn grain is in the late dough-early dent stage. For 120 day corn, this is after 90 days. At this stage the plant contains 60-67% moisture. This moisture range is crucial to making good silage. At this time the corn plant starts to "fire" at the bottom. This means the bottom two leaves have turned brown. Another test point to cut the corn forage is when the corn grain starts the "black layer stage". The black layer starts to form when the grain reaches maturity. It forms near the tip of the kernel when the grain is dented and glazed.

The cut of the forage also has a bearing on the quality of silage. Forage harvesters and choppers with sharp knives set to the cutter bar should make a cut of 1/4" to 3/8" to get the proper range of corn forage particle sizes.

The physical characteristics of good corn silage include cattle readily accepting silage as feed; it has a greenish-brown, but not a tobacco-brown color; not slimy, but moist; and to beef and dairy producers it has a clean pleasing odor, not musty or any visible sign of mold or rot.

Definition of Corn Silage - RCB Conclusion

Corn silage is fermented, chopped whole corn plants. The silage is prepared when the corn grain reaches the early dent-late dough stage, or black layer stage, and the bottom two leaves of the corn stalk have fired or turned brown. When the corn plants contain between 60% to 67% moisture they are harvested with forage harvesters having sharp blades set at the cutter bar to make 1/4" cuts. This cut green forage of various sizes is packed rapidly (within 2 days), but evenly and without any air pockets in an airtight silo. It is not disturbed for at least three weeks. After that time the fermented forage product should have a greenish-brown but not tobacco-brown or black color, moist not slimy, a pleasing, clean odor, not musty or show any signs of mold and be readily accepted by cattle as a feed item.

Other Considerations

This definition of corn silage has been discussed with faculty members of the Department of Biochemistry and Nutrition and the Department of Animal Science at Virginia Polytechnic Institute and State University. This definition is consistent with the definition of silage that currently is being taught.

RCB Recommendation

Using the definition above for corn silage, RCB recommends the registrant proceed with his field trial of mancozeb on corn and prepare the whole plant corn silage as described, then generate the necessary residue data.

References:

1. Feeds and Feedings, Abridged, F.B. Morrison, The Morrison Publishing Company, Clinton, Iowa (1961), pp 188-203.
2. Feeds and Nutrition, Complete, M. E. Ensminger and C. G. Olentine, Jr., The Ensminger Publishing Co., Clovis, CA (1978), pp. 286-317.

TS-769C:RCB:Reviewer(FDG):vg:CM#2:Rm814B:X557-0826:8/5/87:
edited:fdg:8/11/87.

cc: RF,Mancozeb Reg. Std. File, Comm. Def. File,Reviewer,Circu,ISB/PMSD.
RDI:Section Head:R.S.Quick:8/4/87:R.D.Schmitt:8/5/87.