(2-17-92)

MEMORANDUM

Subject: ID# 059639 CLETHODIM (SELECT®) Review of Proposed Label and "Me Too" Crop Field Trial Bridging Data for New Product Registration. (MRID #s 422865-05 and -06) [CBTS # 9859 and 10917] {DP Barcode D178258 and D184921}

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Introduction

Valent U.S.A. Corporation has a new formulation for its herbicide clethodim. To support the registration of Select® Herbicide, which contains 0.94 lb active ingredient clethodim, the registrant has submitted residue bridging data on soybeans and cottonseed. RD requests review of the new label and these crop field trial residue data to determine if the present total clethodim tolerances on soybeans and cottonseed are still valid when the new formulation is used as directed. Our conclusions and recommendation follow.

CONCLUSIONS

1. CBTS Conclusions on **Directions for Use**

   CBTS concludes the registrant has proposed an adequate set of directions for use of its new formulation of clethodim as Select Herbicide for use on soybeans and cotton. The proposed use for Select Herbicide on cotton and soybeans is the same as the directions for use of Select 2 EC. The established total clethodim tolerances on soybeans and cottonseed are not expected to be exceeded when Select Herbicide is used as directed.

2. CBTS Conclusions on **Magnitude of the Residue - Crop Field Trials**

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a. From the data presented CBTS can conclude that total clethodim residues on soybean seeds, hay, and forage are similar from the application of either Select 2 EC or Select Herbicide as directed in side by side comparison trials. Total clethodim residues on soybeans are not expected to exceed the established 10 ppm tolerance when Select 2 EC or Select Herbicide are used as directed. There is no need to change the established clethodim tolerances on soybean products after review of these bridging data. These data can support the registration of the new formulation for Select Herbicide.

b. From the data presented CBTS can conclude that the total clethodim residues in cottonseed are similar from the application of either Select 2 EC or Select Herbicide as directed in side by side comparison trials. Total clethodim residues in cottonseed are not expected to exceed the established 1 ppm tolerance when Select 2 EC or Select Herbicide are used as directed. There is no need to revise the established clethodim tolerances on cottonseed after review of these bridging data. These data can support the registration of the new formulation for Select Herbicide.

RECOMMENDATION

CBTS has no objections to registration of the new formulation for clethodim as Select Herbicide based on our review of the proposed label and supporting bridging crop field trial residue data.

DETAILED CONSIDERATIONS

DIRECTIONS FOR USE

The registrant proposes use of Select Herbicide for post-emergence control of annual and perennial grasses such as Johnsongrass, crabgrass, signalgrass, foxtail, fall panicum, Bermudagrass, and quackgrass in soybeans and cotton. Select Herbicide contains clethodim [E-2[1-(((3-chloro-2-propenyl)oxy)imino) propyl)-5-(2-(ethylthio)propyl)-3-hydroxy-2-cyclohexen-1-one] at 12.6% active ingredient (a.i.) or 0.94 lb a.i. per gallon.

To control annual grasses in soybeans and cotton apply Select at a rate of 13 to 17 fluid ozs per acre (0.125 lb a.i.) in a spray solution of 10 to 40 gallons using ground equipment **only**. To control perennial grasses in soybeans and cotton apply Select at a rate of 17 to 34 fl. ozs. (0.125 lb to 0.25 lb a.i. clethodim) in a spray solution of 10 to 40 gallon using ground equipment **only**. Apply when grasses are actively growing. A

repeat application at 2 to 3 weeks is proposed with the total amount of Select not to exceed 68 fl. ozs. per acre (0.5 lb a.i. clethodim) per crop growing season. Always include a non-phyto-toxic crop oil concentrate (petroleum based) at a rate of 1 quart per acre. This use for the proposed new formulation is nearly identical to the direction for use of Select 2 EC.

The registrant also proposes a spot application treatment using Select and the oil concentrate at a 1:1 ratio (fl.oz: fl.oz). If the desired volume of spray solution for a spot application is 3 gallons, then add 4 fl. ozs. each of Select and the oil concentrate. For larger amounts of spray material for spot application use the ratios of herbicide:spray oil;gallons water.

Restriction are as follows:

1) Do not apply by air,
2) Do not apply through any type of irrigation system,
3) Do not allow Select to come into contact with desirable grass crops such as corn, rice, sorghum, small grains, etc.,
4) Do not graze treated fields or feed treated forage or hay to livestock,
5) Do not apply within 60 days of harvest,
6) Do not tank mix with imazaquin (Scepter®).

The registrant proposes Select be tank-mixed with a number of other registered pesticides; some registered for use on soybeans only and others registered for use on soybeans and cotton. The proposed tank-mates and the application rate along with their approved tolerances are as follows:

1) Bentazon (Basagran®) on soybeans at 0.05 ppm, on soybean forage at 3 ppm, and on soybean hay at 0.3 ppm (See 40 CFR 180.355), applied at 1 to 2 pints per acre (see PP# 5F1529),

2) Sodium salt of acifluorfen (Blazer®) on soybeans at 0.1 ppm (see 40 CFR 180.383), applied at 1 to 1.5 pints per acre (see PP# 9F2158),

3) Chlorimuron ethyl (Classic®) on soybeans at 0.05 ppm (see 40 CFR 180.429), applied at 1/2 to 3/4 oz per acre (see PP# 5F3186)

4) Acephate (Orthene®) on cottonseed at 2 ppm and on soybeans at 1 ppm (see 40 CFR 180.108), applied at 0.25 to 1 lb per acre (see PP#3F1375)

5) Sodium salt of fomesafen (Reflex®) on soybeans at 0.05 ppm (see 40 CFR 180.433), applied at 0.75 to 1.5 pints per acre (see PP# 4F2997),

6) Lactofen (Cobra®) on soybeans at 0.05 ppm (see 40 CFR 180.432), applied at 12.5 fl.oz per acre (see PP#5F3299).

From the proposed uses of these 6 tank mates CBTS does not expect the established tolerances to be exceeded as the proposed use rates are the same or less then that use to generate the magnitude of the residue data on which the tolerances are based.

For use of Select with Blazer, Classic, Cobra, or Reflex the registrant cautions that with sequential application of Select, either just before or just after broadleaf herbicide application there may be some reduction in grass control. To avoid the problems with sequential application the registrant suggests that either apply Select waiting at least 24 hours before applying a broadleaf herbicide; or after applying a broadleaf herbicide wait until new growth starts in grasses (usually 7 days) before applying Select.

The registrant has presented a Confidential Statement Of Formula (CSF) signed by Gary L. Cummings and dated March 19, 1992. While the review of the inert ingredient in the purview of RD, CBTS notes that none of the inerts is expected to alter the residue profile.

CBTS concludes the registrant has proposed an adequate set of directions for use of its new formulation of clethodim as Select Herbicide for use on soybeans and cotton. The proposed use for Select Herbicide on cotton and soybeans is the same as the directions for use of Select 2 EC. The established total clethodim tolerances on soybeans and cottonseed are not expected to be exceeded when Select Herbicide is used as directed.

MAGNITUDE OF THE RESIDUE - CROP FIELD TRIALS

SOYBEANS

The registrant has submitted the results of side by side comparisons of total clethodim residues on soybeans treated with Select 2EC and Select Herbicide in a document titled " Magnitude of Clethodim Residues in 1990 Soybean Bridging Trials" by J.C. Lai, dated August 29, 1991, and coded TSR5068. The MRID number for this study is 422865-06.

Results of total clethodim residues were presented for 4 soybean crop field trials one each in Mississippi, Minnesota, Nebraska, and Iowa in the crop year 1990. At each site there were two plots. One plot was treated with Select 2EC at a rate of 0.25 lb a.i. clethodim in about 20 gallons spray solution per acre using ground equipment 2 times with a repeat application interval of 14 days. The other plot was treated with Select 0.94 EC at a rate of 0.25 lb. clethodim in about 20 gallons spray solution per acre using ground equipment 2 times with a repeat application interval of 14 days. Each application contained one qt/A of crop oil concentrate.

Samples of soybean forage were harvested 22-31 days after the second Select application. Soybean forage samples were immediately frozen. The soybean hay samples were derived from soybean forage by allowing forage to field dry 3 to 6 days before being harvested, then frozen. Thus, soybean hay samples were harvested from the field at PHIs of 28 to 35 days (forage PHI plus field dry time). Dry, shelled soybeans were harvested 59 to 60 days after the last Select application and immediately frozen. A set of untreated control samples were harvested at each test site.

All soybean rac samples were shipped frozen and stored at -20°C until sample preparation and analysis. All samples were analyzed within 6 months of harvest. The registrant has previously submitted adequate 6 month storage stability data. Sample preparation involved either grinding the entire sample in a Wiley mill or macerating the entire sample in a Hobart Food Chopper.

The analytical method used to gather the magnitude of the total clethodim residue data on soybean forage, hay, and the dry beans was Chevron Chemical Method RM-26B-1. This common moiety method has been previously reviewed. The registrant revised this method at CBTS's request and designated the revision as Method RM-26B-2. The revised method has successfully completed a Petition Method Validation (PMV) in EPA laboratories. This method is one of 2 methods recommended to enforce the clethodim tolerances. In summary, the method involves extraction with aqueous methanol, cleanup by alkaline precipitation and acidic back extraction, oxidation to the pentanedioic acid moieties, derivatization to the corresponding dimethyl esters (DME and/or DME-OH), partition of the dimethyl esters in CH_2CL_2, and determination by GC-FPD-S. The claimed limit of detection in soybeans, soybean hay, and soybean forage is 0.1 ppm. A 4 point standard curve was generated each day using the values on 1, 2.5, 5, and 10 ug/ml.

Photocopies of 9 chromatograms showing baseline resolution of DME and DME-OH from 3 ng to 30 ng were presented. 3 photocopies of chromatograms one each for controls of soybeans, soybean forage, and soybean hay showed no UARs that would interfere with the determination of DME and/or DME-OH. 6 photocopies of chromatograms showing fortification of 0.2 to 0.5 ppm of clethodim and 5-OH clethodim sulfone were presented. Review of the fortified samples and the control samples chromatograms confirm a level of 0.1 ppm as a limit of quantitation. However, we feel that the limit of detection is more realistically in the 0.01-0.05 ppm range. 6 chromatograms of field incurred residues were presented each showing positive results. CBTS concludes the registrant has presented adequate supporting chromatographic data for these soybean bridging studies.

Additional method validation data were generated for the clethodim in soybeans study. Control samples of soybean seed, forage, and hay were spiked with clethodim and 5-OH clethodim sulfone at 0.2 and 0.5 ppm. Eight recovery values were generated for each crop matrix. From soybean seeds clethodim recoveries

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as DME ranged from 82% to 130% (X = 106% ± 13%) and 5-OH clethodim sulfone recoveries as DME-OH ranged from 90% to 112% (X = 102% ± 7 %). For soybean hay clethodim (DME) recoveries ranged from 81% to 118% (X = 100% ± 14%) and 5-OH clethodim sulfone (DME-OH) recoveries ranged from 86% to 119% (X = 102% ± 11%). In soybean forage clethodim (DME) recoveries ranged 80% to 122% (X = 100 ± 16%) and 5-OH clethodim sulfone (DME-OH) recoveries ranged from 99% to 122% (X = 112% ± 6%). The registrant has adequately validated the Method RM-26B-1 to gather total clethodim residue data for this soybean study.

In soybeans treated with Select 0.94 EC DME residues ranged from 0.18 ppm to 2.0 ppm and DME residues from Select 2 EC ranged from 0.23 ppm to 2.4 ppm. DME-OH residues in soybeans from Select 0.94 EC ranged from 0.18 ppm to 1.2 ppm (n = 3) and DME-OH residues from Select 2 EC ranged from 0.26 ppm to 1.2 ppm. Maximum total clethodim residues in the dry shelled soybeans from Select 0.94 EC were 3.1 ppm while from Select 2 EC maximum total clethodim residues were 3.6 ppm.

Soybean hay treated with Select 0.94 EC or Select 2 EC had DME residues ranging from 1.1 ppm to 3.0 ppm. DME-OH residues from Select 0.94 EC ranged from 0.16 ppm to 0.72 ppm and DME-OH residues from application of Select 2 EC ranged from 0.17 ppm to 0.79 ppm. Maximum total clethodim residues on soybean hay from either Select 0.94 EC or Select 2 EC application were 3.4 ppm.

When Select 0.94 EC is applied to soybean plants DME residues on soybean forage 22 to 31 days later ranged from 0.47 ppm to 1.2 ppm and DME residues on soybean forage from application of Select 2 EC ranged from 0.47 ppm to 1.5 ppm. DME-OH residues from application of Select 0.94 EC ranged from <0.1 ppm to 0.31 ppm and DME-OH residues from application of Select 2 EC ranged from 0.69 ppm to 1.7 ppm. Maximum total clethodim residues on soybean forage were 1.5 ppm (from Select 0.94 EC) and 2.0 ppm (from Select 2 EC).

From these data CBTS can conclude that total clethodim residues on soybean seeds, hay, and forage are similar from the application of either Select 2 EC or Select 0.94 EC as directed in side by side comparison trials. Total clethodim residues on soybeans are not expected to exceed the established 10 ppm tolerance when Select 2 EC or Select 0.94 EC are used as directed. We see no need to change the established clethodim tolerances on soybean products after review of these bridging data. These data can support the registration of the new formulation for Select Herbicide.

COTTONSEED

The registrant has submitted the results of side by side comparisons of total clethodim residues on cottonseed in a study titled "Magnitude of Clethodim Residues in 1990 Cotton Bridging Trials" by J.C. Lai, dated August 29, 1991, and coded TSR5069. The MRID number for the study is 422865-05.

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Results of total clethodim residues were presented for 4 cotton crop field trials one each in Alabama, California, Mississippi, and Texas in the 1990 crop year. At each test site there were two plots. One plot was treated with Select 2 EC at a rate of 0.25 lb. clethodim in about 20 gallons spray solution per acre using ground equipment 2 times with a repeat application interval of 14 days. The other plot was treated with Select 0.94 EC at a rate of 0.25 lb. clethodim in about 20 gallons spray solution per acre using ground equipment 2 times with a repeat application interval of 14 days. Each application contained one quart per acre of crop oil concentrate.

Samples of cotton were harvested 60 days after the second Select application. The cotton was ginned within 24 hours and the cottonseed was frozen immediately after ginning. The registrant gathered a set of untreated cotton at each test site and handled the untreated samples the same as treated samples.

All cottonseed rac samples were shipped frozen and stored at -20°C until macerated in a Hobart Food Processor. The cottonseed samples were analyzed within 4 months of harvest. The residue analytical method used to gather the magnitude of the residue data for total clethodim residues in cottonseed was Chevron Chemical Method RM-26B-1 (see comments above). The claimed limit of detection in cottonseed is 0.1 ppm.

Photocopies of 6 chromatograms were presented. One chromatogram showed off scale presentation of 15 ng of DME and DME-OH standards. The one untreated control sample shower no interfering UARs. Review of the control and fortified sample chromatograms confirm a limit of quantitation at 0.1 ppm. However, we feel the limit of detection in cottonseed is more realistically in the 0.01 to 0.05 ppm range. Chromatograms of field incurred residues were presented showing quantifiable DME residues. CBTS concludes that the registrant has presented adequate supporting chromatographic data for these cottonseed bridging studies.

Additional method validation data were generated for the clethodim in cottonseed study. Four control samples of cottonseed were spiked with clethodim and 5-OH clethodim sulfone at 0.1 ppm, 0.2 ppm, or 0.5 ppm. Clethodim (as DME) recoveries from cottonseed ranged from 82% to 128% ($X = 107\% \pm 15\%$, $n = 8$). Recoveries of 5-OH clethodim sulfone (as DME-OH) ranged from 84% to 128% ($X = 107\% \pm 13\%$, $n = 8$). The registrant has adequately validated the Method RM-26B-1 to gather the total clethodim residue data for this cottonseed study.

In cottonseed from cotton treated with Select 0.94 EC DME residues ranged from <0.1 ppm to 0.5 ppm and ranged from <0.1 ppm to 0.29 ppm from Select 2 EC application. No DME-OH residues were detected in any of the cottonseed samples above <0.1 ppm from application of either Select 2 EC or Select 0.94 EC.

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Maximum total clethodim residues were the same as the DME residues in these cottonseed studies; ie, 0.29 ppm and 0.5 ppm.

From these data CBTS can conclude that the total clethodim residues in cottonseed are similar from the application of either Select 2 EC or Select 0.94 EC as directed in side by side comparison trials. Total clethodim residues in cottonseed are not expected to exceed the established 1 ppm tolerance when Select 2 EC or Select 0.94 EC are used as directed. We see no need to revise the established clethodim tolerances on cottonseed after review of these bridging data. These data can support the registration of the new formulation for Select Herbicide.

cc:R.F.,Circ.,Reviewer(FDG),PP#9F3743,TOX.
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