UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

Memorandum

DATE:

SUBJECT: BEAD Benefits Assessment for Methyl Parathion Use on Walnuts

FROM: Donald W. Atwood, Entomologist
Herbicide and Insecticide Branch

Jihad Alsadek, Economist
Economic Analysis Branch

THROUGH: Arnet Jones, Chief
Herbicide and Insecticide Branch

David Widawsky, Chief
Economic Analysis Branch

TO: Laura Parsons, Chemical Review Manager
Susan Lewis, Chief
Reregistration Branch 2
Special Review and Reregistration Division (7508C)

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SUMMARY

BEAD has reviewed available data related to methyl parathion use on walnuts. Sufficient alternatives are available with proven efficacy against the targeted pest, codling moth. Market data supports movement from methyl parathion to chlorpyrifos if methyl parathion was not available. Chlorpyrifos currently is the product of choice for control on most acres and is less expensive than methyl parathion. In addition, chlorpyrifos shares the negative correlation to azinphos methyl resistance which was a key factor in methyl parathion registration for this crop. BEAD concludes that there would be no biological or economic impact if methyl parathion was not available for use on walnuts.

LIMITATIONS AND SCOPE OF ASSESSMENT

There are limits to this assessment. Commercial walnut production in the US is limited to California. This assessment is limited to walnuts in general and does not consider methyl parathion usage variances which might occur between different varieties. It is assumed that producers will not shift to alternate crops. This analysis also assumes that farm gate prices are not affected by any changes at the grower level and that growers do not drastically alter their production practices. This analysis will focus solely on operation costs, ignoring overhead and other opportunity costs, which can be difficult to measure and are beyond the scope of this exercise. Thus, net cash returns overstate actual profits to the grower.

The scope of this analysis includes an examination of potential grower and industry-level impacts associated with methyl parathion being unavailable for use on walnuts. This mitigation scenario reflects the health risks to pesticide mixers, loaders, and applicators as identified by the Health Effects Division of the Office of Pesticide Programs.

BEAD estimates of yield losses associated with methyl parathion unavailabilty are based on the best professional judgement of BEAD analysts when estimates are not available from other sources. BEAD estimates are based on a review of available comparative efficacy data, USDA crop profiles, state crop production guides, discussions with university extension and research entomologists knowledgeable in sweet corn production, and other sources listed. Walnut production is a very complex system that can be influenced by a variety of parameters (e. g., weather). BEAD's ability to quantitatively capture the wide array of events that could unfold given each hypothetical scenario listed above is very limited.

PRODUCTION OF U.S. WALNUTS

California produces 99% of the walnuts grown in the United States and 38% of the world's production.[1] Over 40% of the California walnut crop is currently being exported. About 35% of the crop is marketed in shell. Production and crop value for 1999-2001 are provided in Table 1. The average farm size is 38 acres.[2]

Table 1. Production and Crop Value for walnut production.[1]

Year	Bearing Acres (1000)	Yield per Acre (Tons)	Production (1000 Tons)	Price per Ton (dollars)	Crop Value (1000 dollars)
1999	193	1.18	227	1050	238,350
2000	191	1.48	283	886	250,738
2001	193	1.24	239	NA	NA

Walnuts are ideally suited to deep, well-drained, fine sandy loam to clay loam soils, but will not

produce adequate commercial crops without irrigation in most California growing areas.[3] Flood, furrow, and sprinkler irrigation are predominant. Drip and micro-sprinkler irrigation being used more often in marginal soils. Irrigation takes place from mid-April through October. Orchard soils are generally not cultivated, but herbicide-treated tree rows are common. Mechanized winter pruning is practiced. A smooth orchard floor is necessary to facilitate harvest of walnuts that are shaken to the ground, swept into a windrow, and picked up with pickup machines. All these harvest activities are mechanized. Some orchards are disced and rolled before harvest to insure a smooth, firm surface for harvest.

The Sacramento and San Joaquin Valleys of California are the largest production areas. Acreage is well distributed throughout these regions.[3] The coastal valleys in the counties of Santa Barbara, San Luis Obispo, Monterey, and San Benito also have significant production. Unique areas in the Sierra Foothills and Lake County also have some walnut production. Over 15 varieties of walnuts are grown in the state commercially, with numerous other cultivars being planted on a smaller scale. Selected cultivars are grafted onto rootstocks. The three rootstocks generally used in California are Northern California Black, Paradox hybrid, and English Walnut. Both varieties and rootstocks vary in susceptibility to diseases, nematodes, and insect pests.

Activities in the orchard during the summer months include mowing, summer training young trees, vertebrate pest and weed control, and harvest. Pruning occurs between October and January, and mummy nut removal takes place around February.

USE AND USAGE OF METHYL PARATHION ON WALNUTS

California received a Special Local Needs (SLN) label to use methyl parathion on walnuts in 1997. Table 2 shows the use of methyl parathion in California walnuts from 1998 to 2000. The observed increase in acres treated with methyl parathion between 1998 and 1999 illustrates increased usage to control codling moth populations that had become resistant to azinphos-methyl. Usage is now stable at 18% of acres treated. Application is primarily by ground equipment (85-95%).[4]

Table 2. Usage of Methyl Parathion on Walnuts in California from 1998-2000.

Year	Bearing Acreage[1] (1000 acres)	Acres Treated[4] (1000 acres)	% Acres Treated	Pounds AI Applied[4] (1000 lbs)
2000	193	35	18%	56
1999	191	35	18%	57
1998	193	20	10%	33

TARGET PESTS IN WALNUT PRODUCTION

Methyl parathion is used to control codling moth in California walnut production. The use of methyl parathion to control codling moth was initiated in 1997 to control populations that were resistant to azinphos-methyl.

Codling moth is the most economically important pest in walnuts, with approximately 60% of the acreage susceptible to damage.[3] Those acres of susceptible cultivars require one to three treatments per year to manage this pest.

Damage results from the codling moth larvae boring into the nuts and feeding on the kernel. The moth overwinters on the tree or the soil, laying eggs in the spring that emerge as larvae to enter nutlets. Later developing larvae also enter the nuts to feed on the kernel. There are typically three to (less common) four generations per year. The navel orangeworm uses the entry site in the walnut from the codling moth larvae to access the kernel, encouraging populations of this pest. The codling moth is monitored with pheromone traps.

ALTERNATIVE CONTROL

Cultural Control

No cultural methods are available which will provide control of the codling moth.

Biological Control[3]

Although over 250 biological control organisms have been shown to attack codling moth, none are capable of keeping populations below that which causes economic damage. Codling Moth Granulosis virus has been shown to be somewhat effective. It must be ingested by larvae and from 9 to 12 applications are needed each year to cover the long generation time. Timing these treatments is extremely difficult because irrigation schedules prevent growers from getting into orchards in a timely matter. Also, because walnut trees are large, it is not possible to get the thorough spray coverage with this material necessary for reliable control.

Trichogramma platneria, a codling moth egg parasite, has reduced codling moth damage by up to 70% when 12 weekly releases of 150,000-200,000 wasps per acre per week are released in low to moderate population situations. This level of control is not adequate to prevent a buildup over time and economic damage in most walnut orchards in the state.

At this time codling moth mating disruption is not economically feasible in walnuts because of large tree size and the large volume of air which would have to be permeated with pheromone.

Novel ways of applying codling moth pheromones and the parasite *Trichograma platneri* may provide some alternative controls for this pest. Pheromone mating disruption control programs have

been effective in pome fruit for codling moth control when early season pest populations are initially at low to moderate levels. Heavy codling moth pest pressure is not adequately controlled by the pheromone mating disruption programs. However, consultants and University extension personnel report that early season control of codling moths with azinphos-methyl works to prevent buildup of pest populations and has facilitated the success of the codling moth mating disruption programs.

Alternative Insecticides

Table 3 presents all insecticides which are currently used to control codling moth on walnuts. Insecticides with less than 1% of acreage treated were considered ineffective and not included in this analysis (malathion, Bt, carbaryl, naled, and pyriproxyfen).

Methyl parathion was registered as a SLN insecticides in walnuts due to development of codling moth resistance to azinphos-methyl. While azinphos-methyl was once the primary insecticide used to control this pest, methyl parathion and chlorpyrifos are now more widely used in walnut production.

Table 3. Insecticides used to control codling moth in walnuts.

Insecticide - In Order of Importance (Based on Estimated Usage for the Control of Codling Moth)[4, 5, 6]	% Share of Total Insecticide Use (Total Acre Treatments) for Control of Codling Moth[6]	PHI [4]	Limitations and advantages [4]
chlorpyrifos	35.3	14	Reduced from 8lbs ai/A to 4 lbs ai/A. Now limited to 2 applications/year. Effective against azinphos-methyl resistant populations.
esfenvalerate	14.2	21	Very disruptive to biological control of mites.
phosmet	12.7	14	Limited to 12 lbs ai/A. Less disruptive to beneficial mites than some other OP's. Used where minimal non-target impact is essential.
methyl parathion	11.3	14	Effective against azinphos-methyl resistant populations
azinphos-methyl	7.1	21	Under 4 year phase out. Resistant codling moth populations.
tebufenozide	5.9	30	A high priority material. Need for good coverage and large trees limit the utility of this material

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permethrin	5.8	1	Disruptive to biological mite control and not used in the San Joaquin Valley because of this problem
methidathion	2.3	7	Can provide control.
diazinon	2.1	45	Can provide control.
diflubenzuron	1.2	28	A high priority material. Need for good coverage and large trees limit the utility of this material

BIOLOGICAL IMPACT OF METHYL PARATHION CANCELLATION ON WALNUTS

Neither changes in cultivation practices nor use of biological control agents can adequately control codling moth in walnuts at this time. There are alternative insecticides to methyl parathion which are efficacious and currently have greater market share than methyl parathion. While methyl parathion is useful in resistance management, it is not essential. Chlorpyrifos currently has a greater market share and is also effective against codling moth populations which have shown resistance to azinphos-methyl. The scheduled phase-out of azinphos-methyl in the next 4 years will reduce the need for methyl parathion as a resistance management alternative. BEAD feels that there would be little biological impact if methyl parathion was not available for use on walnuts, with the majority of growers switching to chlorpyrifos with no resulting loss in production or quality.

ECONOMIC IMPACT OF METHYL PARATHION CANCELLATION ON WALNUTS

Analysis of proprietary data on insecticide cost indicates there would be no negative impact if methyl parathion was not available for use on walnuts.[6] Data for 1998-2000 show insecticide costs of $26.78 and $20.86 per acre for methyl parathion and chlorpyrifos, respectively. Switching to chlorpyrifos, the current market share leader for codling moth control, would result in a savings of $5.92/acre.[6]

CONCLUSIONS

The absence of methyl parathion as a pest management tool would have no impact on walnut production in the US. This product was registered as a SLN insecticide for use against azinphos-methyl resistant codling moth populations. Chlorpyrifos also has the same negative correlation to resistant pest populations and currently has the largest market share for walnut acres treated. BEAD concludes that most producers currently using methyl parathion would switch to chlorpyrifos. As the price of chlorpyrifos is less than that of methyl parathion, it would also be to the producers advantage to switch to the efficacious but cheaper alternative.

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