

direction. Requesters state that herbicide sprays dry within a few minutes, and that on a typical sunny day drying occurs on contact. The irrigation hook-up crew follows behind the weed control operations, and connect the irrigation tubing injected by the mechanical planter, to the irrigation mainlines existing in the field.

Requesters state that the majority of irrigation work is done on the field edge, which has the least amount of pesticide.

Requesters state that timing of the irrigation operation is critical, since seed pieces are prone to desiccation and disease, and the seed needs water to germinate. Soil into which the seed pieces are placed is dry; thus if the fields are not irrigated immediately after planting, seed pieces will not germinate.

Requesters also note that irrigation system repair is conducted at the time of planting. The drip irrigation system is largely underground and the main line at the field perimeter is reused for every crop. Since it is underground, system damages from harvesting of the previous crop are not evident until planting of the section is started. Drip hookup is performed as soon as possible so system damages can be repaired and the system returned to function before the seed dehydrates. Underground pipes are composed of PVC (polyvinylchloride); thus there is a delay of at least 1 day to dry repair glues.

Requesters utilize furrow irrigation for approximately 2,000 acres of the 36,000 acre plantation, utilizing cane wash water from its factories. Installation of feeder ditches follow herbicide application in furrow irrigated fields. Some fields also are "ratooned," where cane stalks are severed at the base of the plant during harvest, and the cane plant regrows from the stubble. The mechanical planter follows the emerged cane line in ratooned fields and places seed in the gaps where there are no plants. Vegetation is present to heights less than 1 foot. Requesters state that it is readily evident when "sprays have dried and dusts have settled" in ratooned fields.

1. *Alternate practices.* The request was limited to the time until new preemergence herbicides are approved for use in sugarcane fields. Requesters note that application of water to the field before the herbicide operation would result in tractors stuck in the mud and compaction of the moist soil. They state that application of herbicides immediately after planting is critical because it allows for minimal use of pesticides — less material is needed to kill weeds as they try to emerge than to kill weeds after they emerge. Requesters

state that capillary action of water is relied upon to wet the seed, this occurring within 24 to 72 hours depending upon soil type. Requesters state that if herbicide applications were delayed until after seed pieces were wetted, weed seeds would have germinated and herbicide usage rates would need to be increased.

Requesters also note that the HC&S is located on the island of Maui, in a valley with average wind speeds of approximately 30 miles per hour. Pesticide applications must be done carefully to reduce drift to non-target areas; timing of application is used as the variable to control pesticide volume applied, and tractors are used to minimize herbicide usage by more accurately directing material to the target area. Rains from 10 to 40 inches per year are very seasonal; therefore requesters state that the plantation is totally reliant upon drip irrigation for growing crops.

2. *Current regulations.* Requesters noted no pesticide regulations beyond current pesticide label requirements governing their operations. Requesters cited Hawaii's Workers Compensation Plan in discussing the safety and feasibility of their requested exception.

3. *Economic impact.* Requesters state that immature sugarcane stalks are high in moisture content and vulnerable to desiccation resulting in failure to germinate. The cut ends of the stalk (as well as damaged portions of the 40 percent of seed pieces which are damaged physically), are avenues of entry for disease organisms, specifically the fungus *Ceratocystis paradoxa* or pineapple disease. Requesters note that timely treatment, planting and irrigation of seed pieces thus is important.

Requesters note that tractor application of herbicides replaced aerial applications 7 years ago, in order to reduce herbicide usage, improve herbicide placement, reduce off-target drift, and to protect workers and the environment. Requesters also state that aerial applications are estimated to cost 20% more than current tractor costs, or \$137,880 per year. Respraying by hand or tractor application is estimated to cost another \$250,000 per year, to address areas missed along roads and pole lines, and increased weeds when application is delayed due to unfavorable wind conditions. Thus requesters estimate that total increased operating costs for aerial herbicide applications in place of timely tractor applications is \$387,880 per year, an increase of 55 percent over current practice, as well as unquantifiable effects of potential off-target drift and potential for greater worker exposure.

Nighttime aerial application is precluded by undulating terrain, poles and lines transecting fields, difficulty in determining flight path, and variable wind.

Requesters also estimate that water application before herbicide application would impair field trafficability, decrease plant growth, increase weeds, require more pesticide use and additional worker exposure, and cost approximately \$301,600 or 42 percent more than current costs. Requesters estimate that using more tractors to cover the treated seed would require significant capital expenditure, with very poor return on investment since there will be significant amounts of unproductive time between tractor operations. They estimate an increase of \$232,000 in operating costs per year to increase tractors and associated additional manpower, an increase of 33 percent over current operating costs, with no return on investment. Requesters also considered utilizing night operations to minimize the impact of a 12-hour REI. They estimate an increase of \$188,873 in annual operating costs, or 27 percent over current costs for this alternative, primarily due to missed areas, repair to damaged risers, and installation of lights.

Finally, requesters estimate a cost of \$702,000 for adhering to a stated 12-hour REI, due to delayed or reduced germination of seed pieces, a loss of at least 2 months in crop age, and the added cost of hand replanting. They estimate a loss of \$2,332,800 in plantation profitability due to yield impacts.

4. *Pesticide injuries.* Requesters cite the unique nature of sugarcane cultivation in discussing the safety and feasibility of their requested exception. They note that, unlike fields with crop canopies taller than workers, such as cornfields or grape vineyards, newly planted or ratooned sugarcane fields are bare or have vegetation less than 1 foot in height. They cite company policy requiring all workers to wear long-sleeved shirts, long pants, and eye protection. They note that irrigation hookup crews wear company-provided rubber gloves and rubber boots, due to constant contact with water. They state that irrigation crews work on the field edge, which has a minimum amount of herbicide, and that agricultural workers' frequent contact with water will wash off any residue that may be contacted. They note that workers have readily available potable water supplies, ready access to medical facilities, and ready access to Workers Compensation claims if they have a work related incident.