Imperial County Agricultural Briefs

Features

From your Farm Advisors

University of California
Agriculture and Natural Resources

July, 2014

Table of Contents

Mechanical thinning vs. hand thinning in lettuce

Guangyao (Sam) Wang, UC DREC,
Khaled Bali, UCCE Imperial County &
Richard Smith, UCCE Monterey County

In lettuce and many other vegetable crops, thinning and harvest are the two management practices that require hand labor input. Thinning is an important practice because it not only costs producers significantly, but also could affect crop uniformity and yield.

An automated thinner for lettuce has been developed by four companies (Agmechtronix, Blue River, Foothill Packing, and Vision Robotics). These machines employ digital cameras to identify each lettuce seedling, analyze the spacing, and remove unwanted plants by spraying a material (salt, acid based fertilizer, or herbicide Shark) over them to kill them.

Three field studies were conducted in growers' fields at Holtville, California in the 2013-2014 growing season. The growing periods are September to November in 2013 for field 1, November 2013 to March 2014 for field 2, and December 2013 to April 2014 for field 3. A mechanical thinner from Vision Robotics Corporation (San Diego, California, USA) was used to thin romaine heart lettuce mechanically. Manual thinning was used as the control. Plot size was six 80-inch beds and the treatments in each field were replicated two times. All other management practices were conducted by co-operating producers. The impacts of mechanical and manual thinning on lettuce in-row spacing, crop yield, and uniformity were determined in each field.

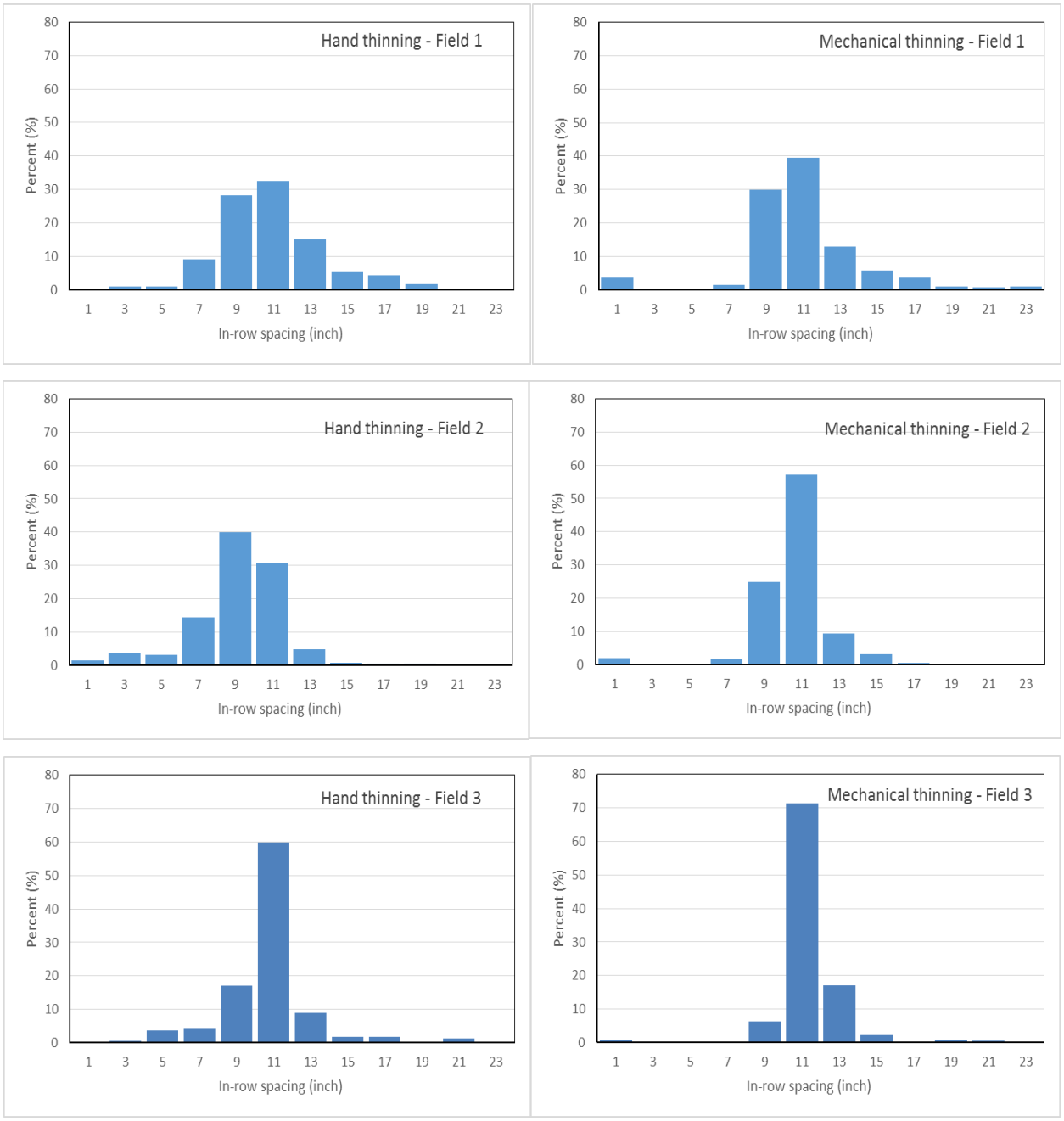

Figure 1. Distribution of in-row spacing affected by hand thinning and mechanical thinning in three fields. The in-row spacing in the X axis is the medium of each column. For example, the column with 11 inch represents the percentage of plants that fall into in-row spacing between 10-12 inches.

Mechanical thinners increased uniformity of in-row spacing in lettuce. Compared to hand thinning, the percentage of plants with desired in-row spacing (10-12 inches) in mechanical thinning increased from 32% to 40% in field 1, from 31% to 57% in field 2, and from 60% to 71% in field 3 (Fig. 1). Both hand thinning and mechanical thinning left a small percentage of doubles (two plants that are closer than 0.5 inch, the 1 inch column in Figure 1) in the fields. However, the mechanical thinner almost completely removed plants with in-row spacing of 2 to 8 inches (<2% in all three fields), while hand thinning left 11%, 21%, 9% of plants with in-row spacing of 2 to 8 inches in field 1, field 2, and field 3, respectively.

The wider distribution of in-row spacing in field 1 was due to poor stand caused by the rain fall in September, 2013. The clay soil in field 2 made hand thinning more challenging, which caused larger differences in in-row spacing between hand thinning and mechanical thinning. The stand in field 3 was the best among the three fields, resulting in better in-row spacing in both hand thinning and mechanical thinning results compared to the other two fields.

Romaine heart yield was similar between hand thinning and mechanical thinning in field 1 and field 2 and slightly increased by mechanical thinning in field 3 (Table 2). The individual plant weight before harvest showed that plants in mechanical thinning were larger and more uniform (data not shown). However, yield differences were small. One of the reasons for lack of significant yield benefit is that hand thinning treatment had higher plant population in the field (Table 3).

Table 1. Romaine heart yield affected by hand thinning and mechanical thinning in three fields. The yield is the number of boxes averaged over two stripes of six 80-inch bed with each being about 1200 feet long.

Field	Hand thinning	Mechanical thinning
1	913	918
2	1064	1074
3	1019	1109

Table 2. Romaine heart lettuce plant population (plant/acre) affected by hand thinning and mechanical thinning in three fields.

Field	Hand thinning	Mechanical thinning	Difference (%)
1	43000	41300	4.1
2	51200	44000	16.4
3	43000	41600	3.4

While removing unwanted plants, mechanical thinners do not disturb the ground and un-thinned plants as it does by the use of hoes in hand-thinned lettuce. The plants in mechanically thinned lettuce are more uniform in in-row spacing and individual plant weight. Although yield benefits were not significant in two of the three fields, mechanical thinning provides a promising alternative to hand thinning.

Acknowledgement

We would like to thank Mike Sudduth and Josh Sells for their support to the project. We also thank Hugo Aguilar and the harvest crew for their help on collecting yield data.

The IR-4 Project and its significance to the low desert farm community

Oli Bachie, UCCE Imperial County &
Brent Boutwell, UCCE Imperial County

Growers of the Imperial Valley and the low desert in general may not have sufficient knowledge of the IR-4 project. In this article we will shed light on what it is, what services it provides and how growers may benefit from the IR-4 project.

The Interregional Research Project Number-4, commonly known as the IR-4 Project was established by the Directors of the State Agricultural Experiment Stations (SAES) and the United States Department of Agriculture (USDA) in 1963 (the IR-4 project, 2013 annual project). It is well known that companies that develop and register pesticides concentrate on large acreage crops and do not consider specialty crops and other minor uses of pesticides as a priority business objective. A minor use crop is by definition one that is produced on 300,000 acres or less nationally. Therefore, the IR-4 was established to fill the vacuum by developing the magnitude of the residue and/or product performance data needed by US Environmental Protection Agency (EPA), the crop protection industry and/or other regulatory authorities to allow pesticide registrations on the specialty crops. The IR-4 concentrates its efforts in the cooperative registration process of pest management technology, preventing potential damage to the crops we eat, performing further evaluations of registered pesticides in relation to food residues, worker safety, other human health and environmental concerns. The IR-4 program investigates all classes of pesticides for use in conventional and organic production systems. Many are identified as "reduced risk" materials and provides a venue for the registration of those materials. Such investigations may help register and replace existing, less desirable pesticides with safer and more environmentally friendly materials. Under the new mission statement of the IR-4 project, the core objectives have been enhanced to include product performance testing to identify pest management solutions to answer priority food producers and horticultural industry, grower needs, international harmonization of maximum residue levels to enhance foreign trade, invasive species management, and registration assistance for products available for organic producers (IR-4 Project: Vision 2020). Approximately, 50% of all new foods use clearance granted by the EPA resulting from the IR-4 research efforts.

Most specialty crops, like Imperial County vegetables, qualify as minor use crops and hence require the IR-4 assistance to gain pesticide regulatory clearance to gain access to crop protection chemicals. The IR-4 project of the Imperial Valley UCCE (local research program) is one of 31 field research centers. It is supervised by a Farm Advisor (Oli Bachie) and conducted by a university trained Staff Research Associate (Brent Boutwell) in accordance with Good Laboratory Practice Standards (40 Congressional Federal Agency and 160 – EPA). The DREC center generates data bases pertinent to our local conditions that are used to help register safer crop protection chemicals for specialty crop growers' use in the Imperial Valley, USA and foreign trading partners. All research activities of the projects are closely monitored by a fully functional Quality Assurance Unit that audits food crop data, field research activities, reports from field research as well as all laboratory reports data analysis under the GLPS.

The IR-4 Field Research Center at the Holtville Desert Research and Extension Center was established in 1994 by Carl Bell and Brent Boutwell. Since then, the center has provided data to the EPA and for minor crop pesticide registrations. During its 20 years' service, the branch has initiated 289 protocols encompassing 362 field trials. In the last three years alone (2010 -2013), IR-4 research resulted in residue tolerances of 103 test substances of interest, including 27 herbicides, 34 insecticides, 34 fungicides, 4 nematicides, 1 rodenticide, 1 plant activator and 1 nitobacter inhibitor on 51 crops of interest. Some of those trials are either completed or ready for submission to the EPA, data sent to manufacturer for submission, completed with ongoing trials or still in progress. It must be noted that results of recent projects may not usually be realized until after 3-5 years due to a lag time between data collection, industry submissions to the EPA and CDPR registration process.

Figure 1; preparing a tractor for use in the IR-4 project

In general, the Imperial County IR-4 supported many crop protection chemical registrations, benefitting specialty crops grown in Imperial County, CA and nationally. Research priorities are

established through a “Workshop” process for Food Crops, Ornamental Horticulture Biopesticide, and Organic Support Programs through a “Call for Proposal” process (IR-4 Project: Vision 2020).

Figure 2: collecting data from one of the trials

The IR-4 program is promoted at local meetings and field days to demonstrate our work and inform clientele of registrations and solicit input for IR-4 project needs. One of the field day demonstrations was conducted on April 17, 2014. Since the IR-4 enhances crop protection chemical registrations, we believe that it definitely benefits conventional and organic specialty crop growers to gain access to pesticides or other chemicals that would otherwise not be available for pest management strategies. Should there be any question or comments regarding the IR-4, readers are encouraged to contact the Imperial County UCCE, Brent Boutwell or Oli Bachie. We will be specially privileged to attend to your concerns.

For more information, please read or visit;

1. IR-4 Project: Vision 2020; http://www. ir4.rutgers.edu/Other/IR-4Vision020.docx
2. IR-4 project, 2013 annual project; http://www.ir4.rutgers.edu/.../AnnualReports/2013%20Annual%2

CIMIS REPORT AND UC DROUGHT MANAGEMENT PUBLICATIONS

Khaled Bali, UCCE Imperial County &
Sharon Sparks, Imperial Irrigation District

California Irrigation Management Information System (CIMIS) is a statewide network operated by California Department of Water Resources. Estimates of the daily reference evapotranspiration (ET_o) for the period of July 1 to September 30 for three locations in the Imperial County are presented in Table 1. ET of a particular crop can be estimated by multiplying ET_o by crop coefficients. For more information about ET and crop coefficients, contact the UC Imperial County Cooperative Extension Office (352-9474) or the IID, Ag Water Science Unit (339-9082). Please feel free to call us if you need additional weather information, or check the latest weather data on the worldwide web (Google CIMIS for the current link to CIMIS site).

Table 1.Estimates of daily Evapotranspiration (ET_o) in inches per day

Station	July		August		September	
	1-15	16-31	1-15	15-31	1-15	16-30
Calipatria	0.39	0.38	0.35	0.32	0.30	0.27
El Centro (Seeley)	0.38	0.37	0.32	0.29	0.29	0.26
Holtville (Meloland)	0.39	0.38	0.34	0.31	0.30	0.27

* Ag. Water Science Unit, Imperial Irrigation District.

Link to UC Drought Management Publications

http://ucmanagedrought.ucdavis.edu/

Water and Drought Online Seminar Series

Khaled Bali, UCCE Imperial County

The latest research-based advice on weathering a drought is now available free online. The UC Division of Agriculture and Natural Resources is working to help farmers cope with the unwelcome outcome of historically low rainfall the last three years. UC scientists, with support from the California Department of Water Resources, have recorded video presentations on high-priority drought webpages.

Each presentation is about one half hour in length and is available at the link below:

http://ciwr.ucanr.edu/

Then click on the drought resources link.

INSECTICIDE EFFICACY AGAINST ALFALFA WORM PESTS, 2013

Eric T. Natwick, UCCE Imperial County &
Martin Lopez, UCCE Imperial County

The objective of the study was to evaluate the efficacy of insecticides used against larvae of the following lepidopterous pests on alfalfa grown for hay production under desert growing conditions:

Beet armyworm (BAW), *Spodoptera exigua* (Hübner)
Alfalfa caterpillar (AC), *Colias eurytheme* Boisduval
Alfalfa webworm (AWW), *Loxostege cereralis* (Zeller).

An insecticide efficacy trial was conducted at the UC Desert Research and Extension Center on a stand of CUF-101 alfalfa. The experimental design was RCB using four replicates with five insecticide treatments and an untreated check. Plots were 20 ft wide by 50 ft long. Formulations and rates for each compound are provided and test materials were applied on 16 Aug 2013 at the specified rate equivalencies listed in the tables. Broadcast applications were delivered through 13, TJ-60 11003VS nozzles using a Lee Spider Spray Trac, tractor mounted spray boom, operated at 30 psi, and delivering 36 gpa. An adjuvant, Hasten, modified vegetable oil (Wilbur-Ellis Company), was applied at 0.25% vol/vol with all insecticide treatments. Pretreatment evaluations of insect populations in each plot were conducted on 15 Aug or 1-day pretreatment (1-DPT). Post treatment evaluations were made on the following specified dates and days after treatment (DAT) 19, 23, & 30 Aug, and 9 Sep or 3-DAT, 7-DAT, 14-DAT, and 24-DAT. The post treatment averages (PTA) were calculated for each treatment. During each evaluation, ten 180° sweeps per plot were collected with a standard 15-inch diameter sweep net. Sweep samples were bagged, labeled, and frozen for later counting of BAW, AC, and AWW larvae (Tables 1 - 3). Treatment means were analyzed using 2-way ANOVA and means separated by a protected LSD ($P \leq 0.05$).

Pretreatment numbers of BAW larvae were similar among treatments (Table 1). Beet armyworm means for all insecticide treatments significantly lower than the untreated check 3-DAT, 7-DAT and for the PTAs, but there were no differences among the means 14-DAT and 24-DAT.

Pretreatment numbers of AC were low but similar among treatments (Table 2). Means for AC were significantly lower in all insecticide treatments for the PTAs compared to the untreated check but there were no differences among the treatments on any of the post treatment sampling dates. Pretreatment numbers of AWW were similar among treatments (Table 3). There were no differences among the treatments for AWW 3-DAT, 14-DAT and 24-DAT. The AWW means for Besiege, IKI-3106, and Intrepid 2F were significantly lower than the untreated check 7-DAT. None of the insecticide treatments had AWW means that were lower than the check for PTAs.

Table 1.

		BAW per ten sweeps in alfalfa					
Treatment	Fl oz/acre	1-DPT	3-DAT	7-DAT	14-DAT	24-DAT	PTA
Check	---------	3.75 a	6.25 a	42.75 a	1.50 a	0.75 a	12.81 a
Besiege	9.0	3.50 a	1.25 bc	0.75 c	0.75 a	0.00 a	0.69 c
Warrior II	1.92	3.50 a	5.25 ab	22.00 b	2.00 a	0.25 a	7.38 b
IKI-3106 50 SL	16.4	4.25 a	0.00 c	0.50 c	2.00 a	0.25 a	0.69 c
Intrepid 2F	8.0	3.75 a	0.50 bc	0.50 c	0.75 a	0.50 a	0.56 c
Belt 480 SC	2.0	5.75 a	1.25 bc	0.25 c	0.25 a	0.25 a	0.50 c

Means within columns followed by the same letter are not significantly different, *P*>0.05, LSD.

Table 2.

		AC per ten sweeps in alfalfa					
Treatment	Fl oz/acre	1-DPT	3-DAT	7-DAT	14-DAT	24-DAT	PTA
Check	---------	2.25 a	2.00 a	1.75 a	0.50 a	0.00 a	1.06 a
Besiege	9.0	1.75 a	0.00 a	0.00 a	0.00 a	0.00 a	0.00 b
Warrior II	1.92	2.00 a	0.00 a	0.50 a	0.25 a	0.00 a	0.19 b
IKI-3106 50 SL	16.4	2.75 a	0.00 a	0.00 a	0.25 a	0.00 a	0.06 b
Intrepid 2F	8.0	1.25 a	0.25 a	0.00 a	0.00 a	0.00 a	0.06 b
Belt 480 SC	2.0	3.50 a	0.25 a	0.00 a	0.25 a	0.00 a	0.13 b

Means within columns followed by the same letter are not significantly different, *P*>0.05, LSD.

Table 3.

		AWW per ten sweeps in alfalfa					
Treatment	Fl oz/acre	1-DPT	3-DAT	7-DAT	14-DAT	24-DAT	PTA
Check	---------	1.75 a	1.75 a	1.75 ab	1.00 a	0.50 a	1.25 ab
Besiege	9.0	1.25 a	0.00 a	0.00 c	0.00 a	0.00 a	0.00 b
Warrior II	1.92	1.75 a	2.25 a	8.50 a	1.25 a	0.25 a	3.06 a
IKI-3106 50 SL	16.4	1.25 a	0.25 a	0.00 c	0.25 a	0.00 a	0.13 b
Intrepid 2F	8.0	1.00 a	0.25 a	0.00 c	0.00 a	0.00 a	0.06 b
Belt 480 SC	2.0	0.00 a	0.25 a	0.25 bc	0.00 a	0.00 a	0.13 b

Means within columns followed by the same letter are not significantly different, *P*>0.05, LSD.