

By Richard L. Camera

**M**echanical weeding in the vine row is being done in many vineyards in place of residual herbicides. However, the decision to use mechanical weed control in the vine row should not be made quickly.

Discs, tillers, rotary weed heads, mowers, and weed bars can all be used. Each has its own strengths and limitations. Some machines deal better with certain soil conditions than others. Some have a choice of heads that can be used on the same machine.

Most machines have automatic sensors or a tripping mechanism of some type to move the tool in and out around each vine. Some have manual controls which can be used to override the sensor. This is important when weeds are large enough to activate the tripping mechanism. The choice of equipment and technique must match the site and conditions just as precisely as the rootstocks.

The large array of machines available all rely on only a few basic ways to kill weeds mechanically.

#### **Uprooting and moving the weeds**

Some devices, such as a hoe-plow, uproot weeds. This moves a lot of soil along with the weeds, and indeed, that is why it is very effective, even with large weeds. It requires throwing the soil back later into the vine row. When properly timed, returning the soil can also suppress weeds.

Other machines employ the same concept as a hoe-plow to remove weeds, but use a rotating head with teeth or

# Mechanical weeding in the vine row

tines. These machines generally are faster than a hoe-plow, and can be adjusted to move more or less soil, according to the conditions.

These machines all uproot the weeds and place them in the tractor row to be disced under. Ideally, by the time you want to throw the soil back, the weeds have decomposed into the soil and are gone. Throw-back is often done as part of the normal discing in the tractor row or can be done with special border discs for this purpose. Some of these tools can do their own throw-back.

#### **Undercutting the weeds**

This method of weed control uses a weed bar which is a knife or bar drawn along a few inches under the soil to undercut the weeds.

Knives of various sizes, from 14-inches to 24-inches long, can be used to match your vineyard needs, providing more or less weed control area. Weed bars are very good if you are in a no-till situation as they do not move soil into the tractor row and do not require throwing soil back. All undercutting efforts are most effective under less severe conditions: lighter soils, small weeds, no bermuda grass. Generally, repeated passes during the season are required to be effective.

#### **Mowing down the weeds**

In no-till situations, mowing is the preferred method of weed control. Under-the-vine mowers go around the vines and simply mow down weeds.

Other mower heads are available which come mounted on each side of the mower and have state-of-the-art sensing systems which enable them to retract around each vine. These machines are generally under-powered for heavy weeds in the early spring, however, and do not work effectively because the sensors mistake large weeds for vines and don't cut them.

#### **A combination approach**

The weed and soil conditions early in the season are usually very different from those in mid-summer. Some vineyards require a different approach and tool for each situation.

In 1993, I applied alternate row culture (where one aisle is disced and one aisle is no-till) and used a combination of approaches to control weeds. The advantages to this technique are very site-specific, but it has allowed me to use the tools that are best-suited to each situation.

I first drove the tractor in the disced aisle with a Weed Badger under manual control to work on large weeds in the vine row, where it is capable of 80% to 90% weed control doing only one side of each vine row. Later, I drove down the no-till aisle with a Clemens and caught the island of weeds left behind the stake by the Weed Badger, as well as other weeds. The Weed Badger essentially cleared the large weeds out of the way, allowing the Clemens to operate on summer weeds.

#### **Questions to ask before tool purchase**

##### **1) Which method(s) do I want to use?**

Which method you will choose depends on several factors. Is the vineyard cultivated till or no-till? What limitations do the soil, rocks, and other conditions present? What you decide will depend on your site.

##### **2) What are the largest weeds I can expect to remove?**

Large weeds do limit the automatic sensing systems which move these tools around the vines. They are, at their most sophisticated, electronically-controlled hydraulic systems. They almost all have some type of rod or bar which is designed to contact the stake and, in turn, activate an electronic switch that opens a hydraulic valve and initiates the retraction and extension of

the weeding tool.

Most mechanisms are easily defeated when weeds are large enough to trigger the sensor. Only a few have an effective manual override which allows the operator complete freedom, regardless of the weed growth.

### 3) What type of tractor will power this unit?

It is important to know the exact method by which the tool will be powered. Consider carefully whether your tractor will be compatible before you purchase the tool. Some tools have their own self-contained hydraulic systems powered by a PTO-driven pump. Some use the tractor's hydraulics, and some use both. Some tractors have hydraulics which make them more or less able to power these different tools.

Some tools will require some electrical power from the tractor.

Many of these tools offer a choice of mounting location: front-, mid-, or rear-mount. You will have to live with this decision and it should be discussed with

the equipment representative. Some of these tools operate automatically and need not be watched at all, but I prefer to see the tool in action from the driver's seat without turning around. Therefore, I favor mid- or front-mounted tools.

I like to use both ends of the tractor, if possible, and to mount weeding tools in combination with a mower or discs pulled behind the tractor. This is especially important when large acreage is being farmed and it is critical that tractor time be used efficiently. When I use a front-mounted double Clemens, I have a mower on the three-point. When I use front-mount border discs, I have a pull disc behind. When I use a Weed Badger (rear-mount), I have a border disc on the front.

### 4) How much space is there in your vineyard?

Whichever tool you choose, you will have to accommodate the vineyard layout. If you are establishing a vineyard layout to incorporate mechanical weeding, distance the rows so as to maximize effi-

ciency of the equipment. Choose a tractor which best matches the method and the tool(s) you want. This inter-relationship of the vineyard dimensions to the tractor/tools can be critical to the success of the cultural practices.

Most mechanical weed-control techniques require moving soil back and forth in the vine row. If the vineyard avenue is narrow, there might not be room to turn a tractor with front- and rear-mounted tools. High-density planting (narrow row width) will limit the distance that a tool can extend beyond the tractor and may preclude the use of one method or another.

It is important to recognize that speed for most operations will be reduced as the row width narrows. With less room to wander down the row for mowing, discing or whatever — the slower you must go to avoid tractor blight. Since doing more than one task at a time requires slower speeds, it makes sense to combine operations in closely-spaced vineyards, where speed is already re-

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duced. This can cut costs dramatically, while allowing mechanical weed control.

#### 5) Is one tool going to be enough?

Will you achieve the weed control you want with only one tool? Some tools can serve you well on their own. The Weed Badger, for example, deals with weeds of all sizes. Depending on the acreage, it could be the only tool you need. The Clemens, on the other hand, does not work well on large weeds or where weed growth will interfere with the trip bar. It is recommended for two to three passes in the late fall, early spring, and summer as a weed control program.

#### 6) What options should I get?

Each tool offers options that may provide you more control. These help fine-tune the tool's use, and ultimately give you better weed control. Get a good explanation from the dealer or manufacturer directly as to what each option does, then see if it is needed.

The Weed Badger and Clemens, among others, for example, can include an optional tilt control to allow for weeding on side hills where one row of vines is above the tractor and the other is below the tractor. This option is crucial in all but the flattest vineyards.

#### Other considerations

Consider the following factors when

deciding to use mechanical weed control:

First, if you have been using herbicides for many years, you may underestimate the amount of weeds to expect once you switch to mechanical control. I have found that the area under the vine, once disturbed, becomes more attractive to weeds and may present a bigger challenge than you may anticipate. You have taken what was a dead zone under chemical control and made it alive again. This will increase the overall health of the soil but will also grow better weeds.

Second, the size of the vineyard should influence how you choose weed control tool(s). Obviously, the economics will be better if you can use the equipment over more acres. However, with a large acreage, you can tie up a tractor for many extra hours on weed control if you choose a tool that is not well-matched for your conditions.

Third, if you have drip irrigation with an emitter at the base of the vine, you might consider moving the hose to place the emitter between vines. Most tools have a weakness directly around the stake/vine. The tools depend on the sensitivity of the sensing rod. Don't encourage summer weeds where they are the most difficult to control. Moving the emitter between the vines will foster summer weeds that come with irrigations to grow only where these tools can

do their best. It also may benefit the vines by giving them a better wetted area than just around the stake.

Fourth, remember to consider the effects of changing soil types on mechanical weed operation, and the ease with which settings can be changed in the vineyard. A setting that results in optimal weeding in sandy loam may not do the job when you reach a heavier, dry clay loam. Also, rocks buried or on the surface can interfere with weeder operations or damage equipment.

It may take more than one year for you to feel comfortable about your weed control practices using these tools. Gone will be the "spray-it and forget-it" days. You will be forced to become a better farmer as you have to closely observe the conditions throughout the year and respond to them. Gone also will be the times when failures in chemical control will defeat you, because you will get several chances to weed mechanically per season.

Best of all, I have felt better about my success in reducing chemical use in the vineyard than almost any other problem I have had to overcome as a grower! ■

*(Richard Camera gained much of the above experience while managing a vineyard in the Carneros district of California. Camera is now director of vineyard operations for the Hess Collection on Mt. Veeder (Napa Valley) and Monterey County.)*

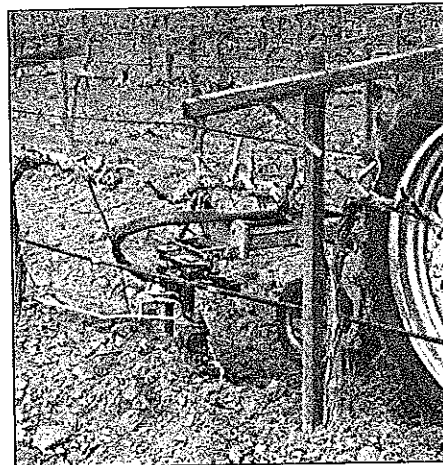
## Mechanical-weeding equipment

### Clemens Radius Weeder

The Clemens radius weeder is utilized as a complete replacement for in-row chemical weed control. It uses a 24-inch knife, operating one inch to six inches below the soil surface to cut through and destroy the root system of weeds and grasses (other knife lengths are available).

In most operations, a mechanical sensor rod contacts the grape vine, thus initiating retraction of the knife to protect the vine. Due to the unique design of the Clemens radius, the sensor will stay in contact with the vine to provide cultivation very close to the vine as selected by the operator.

For new vineyard plantings, the optional ultra-sonic radius uses a sonic beam rather than a mechanical sensor so



there can be no damage even though the vines are super-sensitive.

Due to the hydraulic design by Cle-

mens, the units operate at speeds up to 6 mph, without building up heat in the tractor hydraulic system. Only 1.5 gallons/minute is required for each radius being operated from the tractor hydraulic system.

Mounting of the Clemens units can be in front, at the side, or on the rear 3-point hitch of almost any tractor used in a vineyard.

Clemens offers units for in-row tillage only or units that fully cultivate the space from the middle of one row across to the middle of the next row.

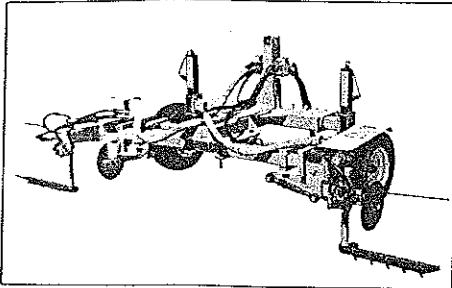
All Clemens models are adjustable for row width, berm angle, and depth control to assure complete weed control when used two or three times each year.

To locate the nearest Clemens dealer for more information, contact: KEM Equipment, Inc. 10800 SW Herman Rd., Tualatin, OR 97062, tel: 503/692-5012 OR KEM Equipment Inc., 2775 E. Malaga Ave. #108,

Fresno, CA 93725, tel: 209/442-6099. Dealer inquiries are welcome. Please see our ad, page 7.

**Gearmore Inc.**

Gearmore announces a new line of 3-point hitch in-row cultivators. These quick on-and-off cultivators plug into the tractor remotes for easy installation. They are available in single- and double-row configuration for vineyard row widths from seven to 12 feet. At speeds up to 5mph, the automatic sensors retract the blade when passing vines and the blade immediately returns to the working position. This is an environmentally safe answer for effective berm weed control.



For more information, contact: Gearmore, Inc., 2255 Pomona Blvd., Pomona, CA 91768, tel: 800/833-3023. Please see our ad, page 5.

**Kimco Mfg., Inc.**

Kimco Mfg., Inc. has just introduced a new doubles version of its Model-9300 In-Row-Tiller. This allows a tiller to be mounted on each side of the tractor to work two rows at once, allowing the operator to cover over twice the acreage per day as with a single side-unit.



Specifically designed for the larger grower, the Kimco doubles maintains all the durability and function the Model-9300 is known for:

- 1) Ability to closely follow the vine regardless of ground speed.
- 2) The head is free-floating to ride over hidden obstacles.
- 3) Control system allows the operator

to override the automatic system.

- 4) All pivots are mounted in tapered or ball bearing for increased durability.
- 5) Choice of head style to meet various conditions.
- 6) Increased ground speed.
- 7) Ease of operation.
- 8) Forward visibility.
- 9) Able to work any time of year under any weed conditions.
- 10) Can be used in conjunction with other tools.

The Kimco doubles, in addition to its standard single-side tiller and its narrow-row front-mounted tiller, now covers the complete spectrum of tillable vineyards from the very narrow row up to the large acreage operation.

With the advantages of cultivation such as: 1) soil aeration; 2) removal of weeds and debris from the vine row; 3) drastic reduction or elimination of herbicides; 4) reduction of government paperwork and permits; and 5) very cost-effective; Kimco now offers the equipment for all sizes of vineyards.

For more information, contact: Kimco Mfg., Inc. Fresno, CA, tel: 800/356-9641, fax: 209/277-9358.

Please see our ad, page 43.

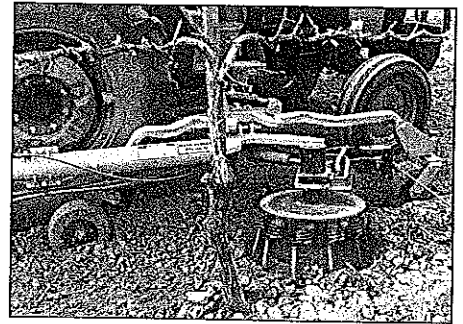
**Weed Badger Division**

"Products to profit people and the planet" is the mission of the Weed Badger Division of Town & Country Research & Development, Inc. In-row cultivation is the focus and specialty of the company. The company has 15 years of experience producing in-row tillers and mowers for the international vineyard industry.

Weed Badger high-speed, precision in-row tillage is the most practical, cost-effective alternative to chemical weed control. Eliminate dangerous and expensive chemicals. Stop wasting time with government paper work. Sweep and sanitize the strip every time.

Revitalize vineyards that are overgrown with large, problem weeds. Kill Johnson and Bermuda grass. Reduce pest and disease problems. End health risks for workers. Quit worrying about pollution liability and other legal complications. Improve water penetration and irrigation efficiency. Weed Badger does a lot more than just kill weeds.

Weed Badgers have 'up-front' visibility. Select from ten models: three-point

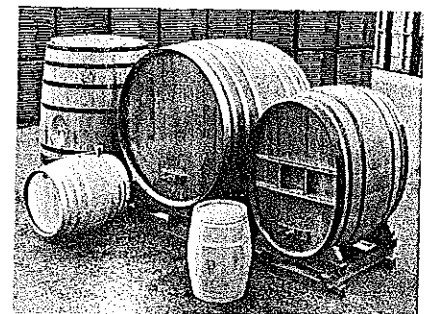


and side-mounted. Operators choose from fully automatic, semi-automatic, or manual override. Make on-the-go adjustments. Shape berms as you kill weeds. Pick from sweepers, disks, under-cutter blades, brush rakes, and a wide variety of other options to customize the Weed Badger for your vineyard operation. Weed Badger is a versatile 'tool carrier.' It is the only vineyard tiller you'll ever need.

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