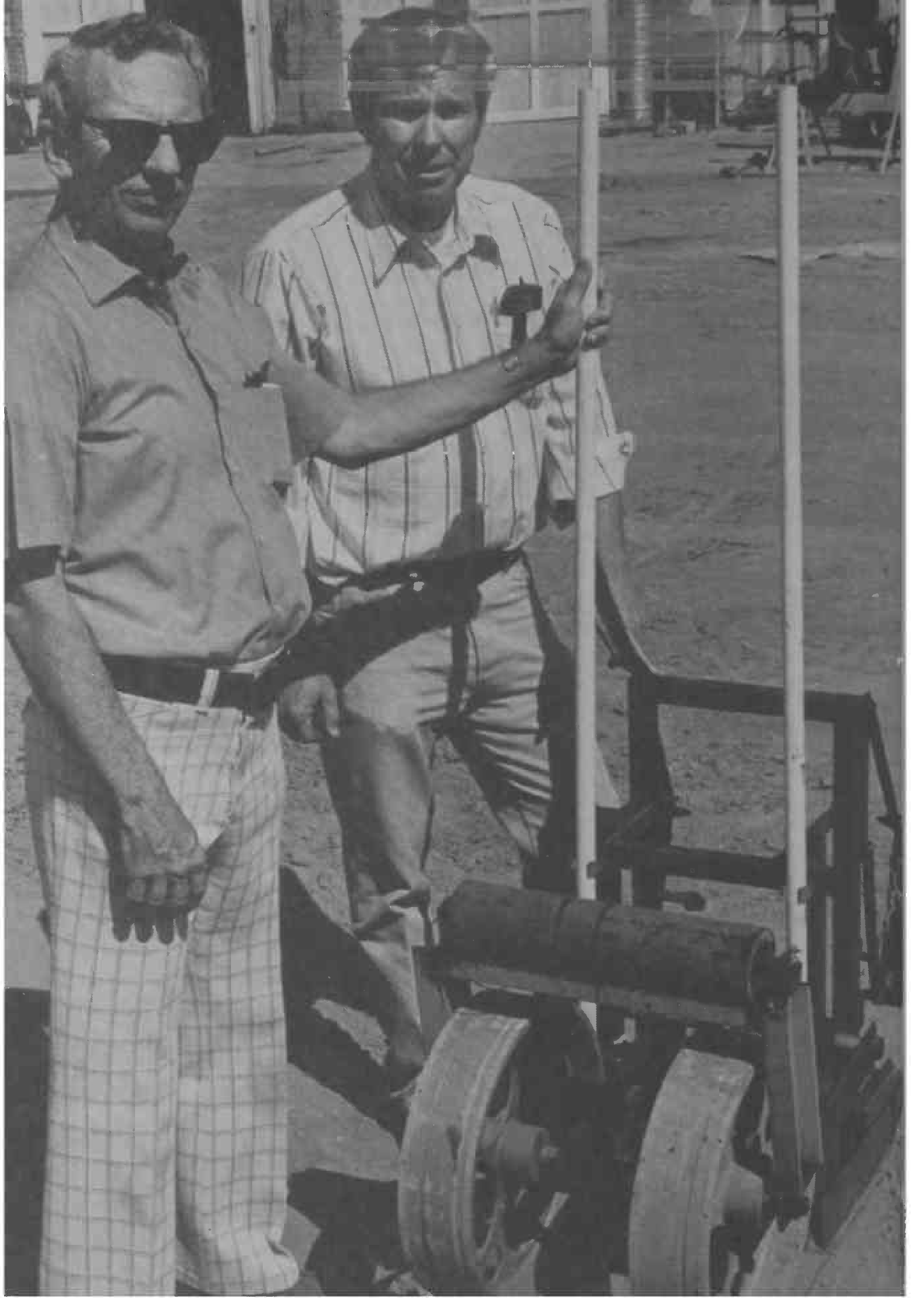
LETTUCE BE PRECISE

Steps towards putting vegetables right where you want them

by George Sharples and Joe Gentry*



THE MEN and their machine (Sharples on left, Gentry on right). The seed tablets are contained in the dual plastic pipes, and placed alternately in two rows. The tablets are by Sharples, the machine by Gentry.

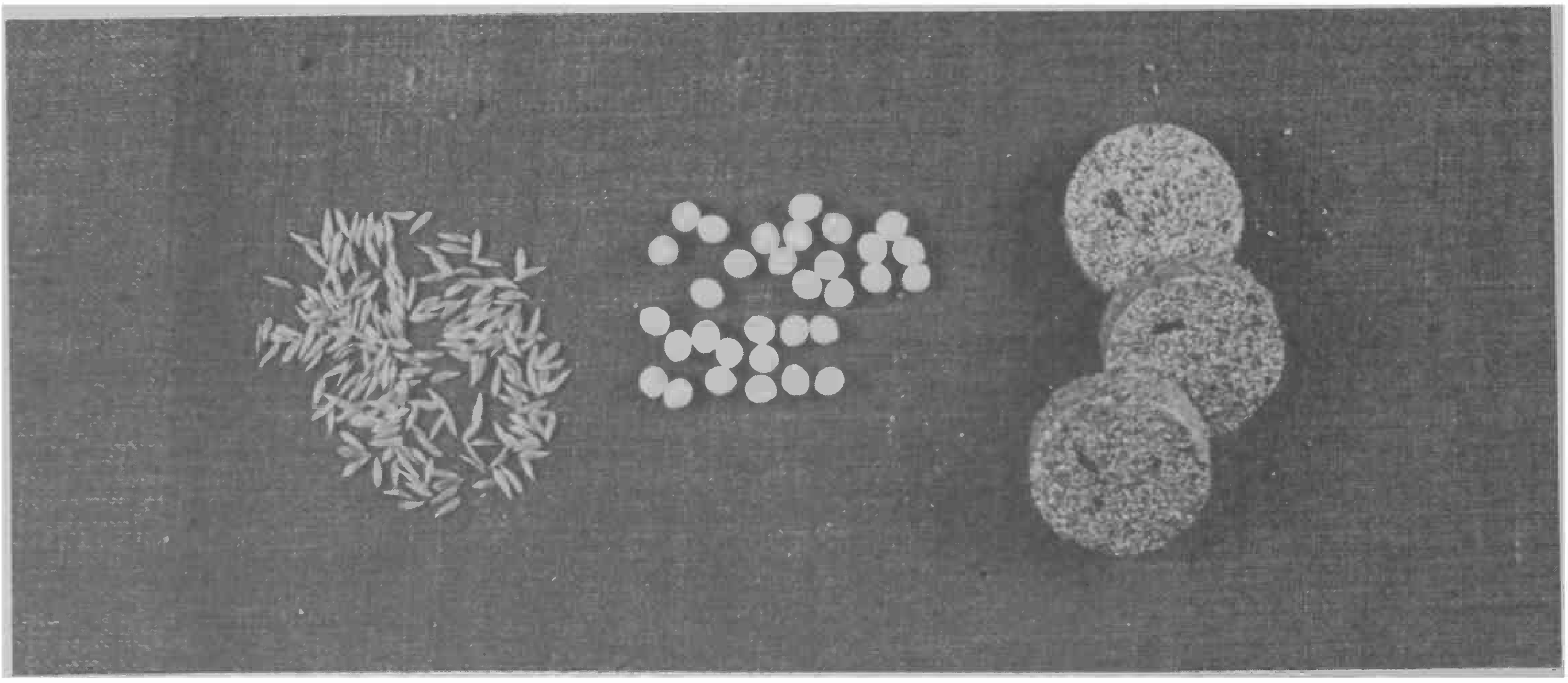
One of the first things agricultural scientists did to eliminate the expense and backbreaking labor of thinning vegetable row crops by hand was to coat the naked seeds to increase their bulk.

This permitted the seeds to be handled by the rather clumsy fingers of special mechanical planters and placed in the ground at designated intervals.

This worked nicely enough, but it didn't solve the problem of getting the seed at just the right depth in order that the seedlings not be thwarted in their rise to the surface by the crust that commonly forms on Arizona soils after a rain.

One solution to that problem came from R. E. Rothfelder of California Zonolite Corp. who hit on an idea; using seed tablets about the size of a fat quarter (¾" in diameter by ¼" thick), we have found we can provide the seed with nutrients to help it grow, fungicides to protect it and, in the vermiculite tablet itself, a material that will not crust after rain.

What happens is this: The tablets containing one seed each are stacked in the planter to be pulled along the surface. As a device pushes each tablet out, a packing wheel tamps it flush with the soil surface.



FROM LEFT to right are: naked lettuce seed, coated lettuce seed, and the new seed tablets

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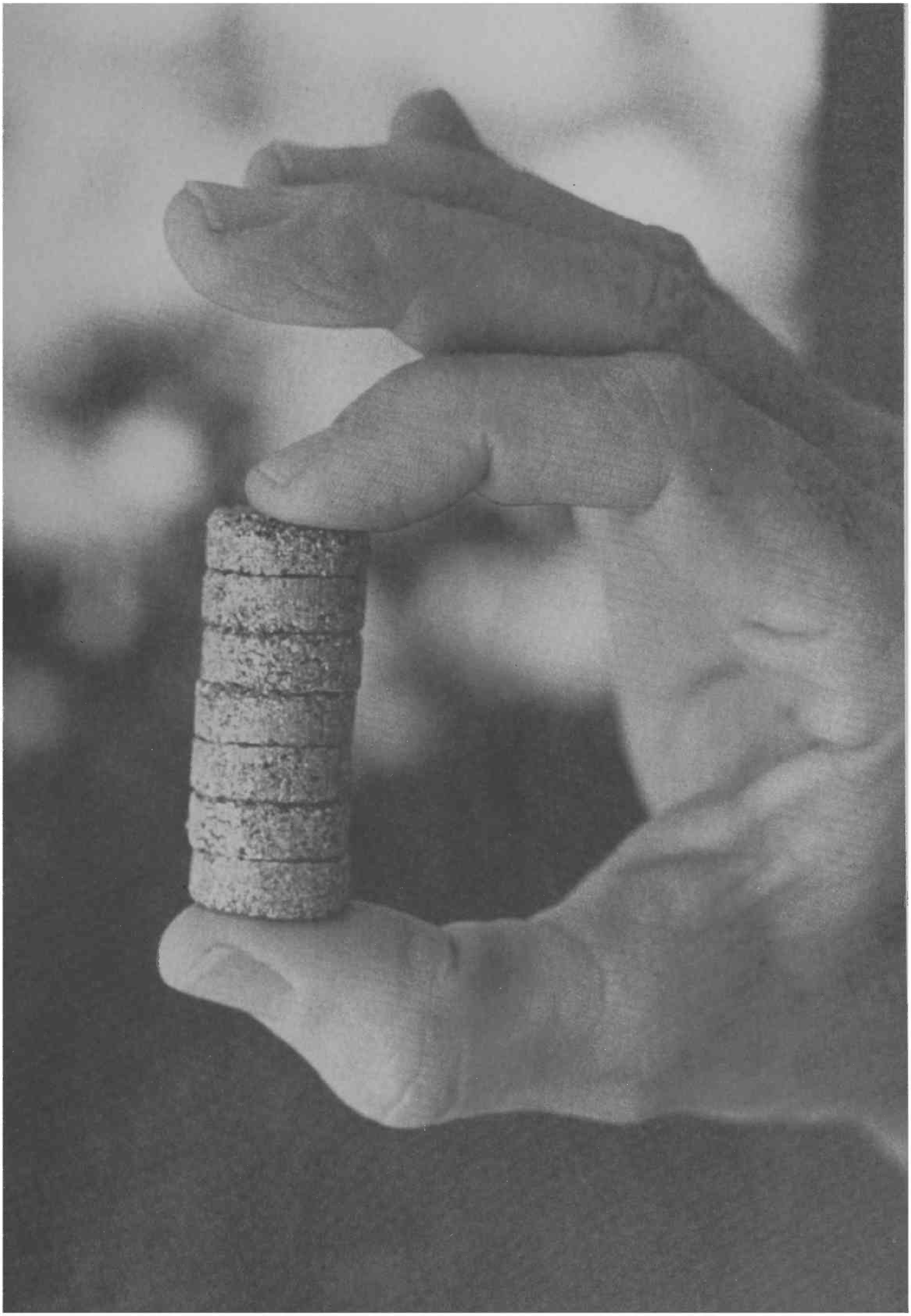


SEED TABLETS—The trick is getting the seed in the right place within the tablet to insure successful germination. The next step—for commercial users of the tablets—is to perfect a device that can handle thousands of tablets at a time.

ORDERLY ROWS of precision-planted lettuce thrive at the Mesa Branch Experiment Station. Precision planting removes the need for thinning the plants, permitting them optimum room to develop.

And it all works very nicely. But.

First the good news. The seed tablets did perform very well in most cases.

In the initial tests with lettuce in sprinkler irrigated fields the tablets were planted on edge. Seed which germinated 95-97 per cent in lab tests produced seedling stands of 60-70 per cent when planted in December, and jumped to 94 per cent when the tablets contained 5-10 per cent activated carbon.

We don't know why the carbon worked that small wonder, although lab tests showed that the carbon allows lettuce seeds to germinate over a wider range of tablet water content. On the other hand, broccoli and tomato seeds didn't respond to the carbon .

Nonetheless, increasing germination and seedling production in lettuce is value enough when you consider that Arizona's lettuce crop brought in about $70.8 million to growers in 1976 and that during some weeks of harvest, Arizona supplies as much as 80 per cent of the lettuce consumed in the United States and Canada.

Adding fungicides to the tablets also produced small but significant improvement in lettuce seedling emergence. And the addition of phosphorous stimulated seedling emergence from tablets planted in cold soil. Nitrogen and potassium additives had no effect that we could see on early seedling emergence.

To be certain that the tablets enjoyed high water carrying capacity, we incorporated a newly synthesized polymer capable of absorbing 2,000 times its weight of water, and known rather aptly as a "super slurper."

In lab tests with tablets containing 3 per cent of the super slurper, seedling growth rates rose significantly, while field tests showed that the polymer increases total seedling emergence from the tablets, but does not affect seedling size.

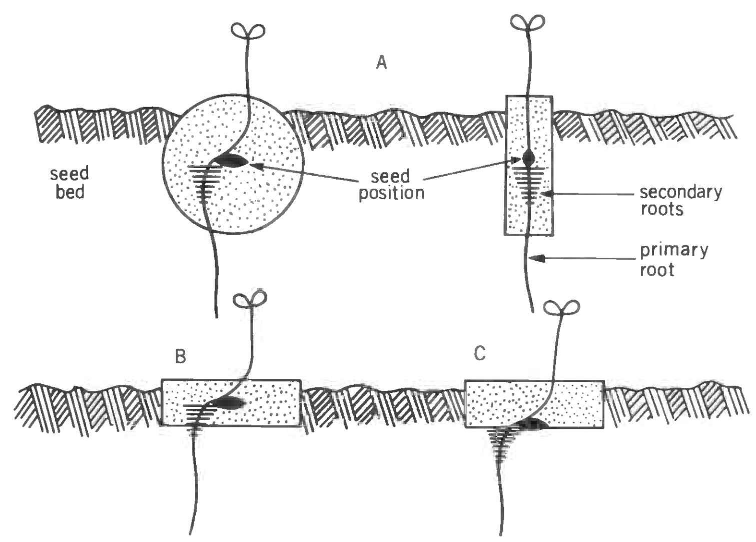
So things looked just fine, until we got results back on hot weather planting. And then—nutrients, fungicides, and polymers notwithstanding—seedling survival was drastically lowered from what it was for those produced from naked seed.

After three days of sprinkler irrigation, we turned off the water to check the progress of the seedlings, and in the time it took to check, they all collapsed.

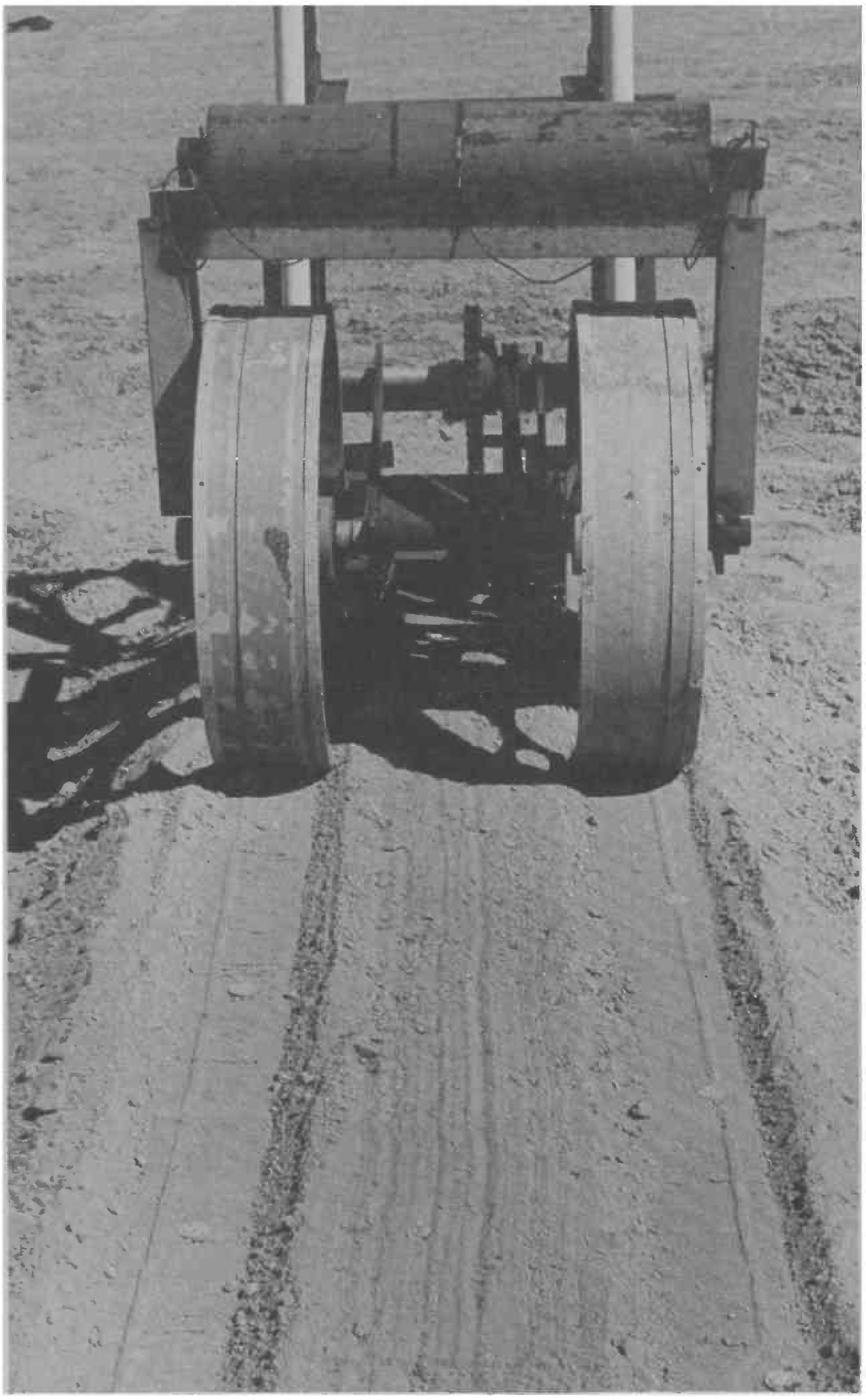
Our only explanation for this is the possibility that the tablets themselves just don't permit adequate water storage or supply to the water absorbing organs of the plants—the root hairs. The hairs are confined within the tablet boundaries during the first 10-14 days of growth, and although vermiculite can absorb large quantitites of water for its weight, it does dry rapidly and conducts water poorly from surrounding moist soil. The problem is naturally compounded when you consider that dry soil in the Arizona sun reaches temperatures of 140 degrees and wet soil about 105.

Promising results were obtained in warm weather planting by placing the seed on the outside of the tablet and planting the tablets seed-side down providing the seedling quick access to the soil proper. But doing this negates the effect of the activated carbon and may neutralize the effect of the fungicides as well.

Now we're concentrating on finding a more effective vermiculite binder—one that will better resist handling loss and yet disintegrate quickly when exposed to water, thus permitting unrestricted seedling emergence.



ABOVE: The various methods of positioning seeds within the tablet has much to do with the chances for successful germination. Below: The tamping wheel is about to tamp the seed tablet flush with the top of the soil.



A STAGGERED procession of tablets emerges from the tablet planter as it is drawn along a furrow (above). The lettuce seedling thrives within its tablet of nutrients (below). For emphasis, the tablet has been removed from its usual flush-with-the-soil position.