

## REQUIREMENTS IN DESIGN OF COMMERCIAL FERTILIZER

### METERING DEVICES, SHOES AND MOUNTINGS

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The rapid rise in the demand for a complete and balanced commercial fertilizer program in the beet sugar industry has brought forth, among other things, the problem of efficient and practical application. As our stock piles of nitrogen and phosphate increase, along with our "know-how" in meeting the questions of soil deficiency, then the only remaining major limiting factor in the realization of this program is how well we find an answer to the requirements in design of placement equipment.

If we grant the premise that commercial fertilizer should be deeper than the best seed and that better results can be obtained from band application rather than from broadcasting, then our placement machinery requirements can be narrowed down to side-dressing equipment as the principle means of application. This is particularly true in most of the areas served by the Utah-Idaho Sugar Company.

In the designing of any piece of mechanical equipment used by the farmer we can't work toward modern agronomic principles and mechanical perfections alone, but must consider a number of other requirements that are limiting, insofar as complete use of the tool is concerned. Generally these other factors concern the farmer himself.

The regular John Deere phosphate can and is doing a very good job of metering out commercial fertilizers. The farmer likes them because the cans are rugged and dependable and he is familiar with them, and the fact that there is a set on nearly every beet growing farm cannot be overlooked. While the feed rate adjustment may not be accurate enough for experimental work it will serve in commercial plantings very nicely.

The design of shoes for commercial fertilizers placement is, in my opinion, our biggest problem. There are several types and variations in use now, all of which are good under some conditions but none of them are good under all conditions. Trash gathering on the shoe or digger type aggravates the ever present danger of moisture loss through too much loosening of the soil. This can be helped by placing a colter just ahead of the digger point to cut trash and reduce the lifting up action by breaking the soil bond at this point. The disc type shoe takes care of the trash problem but has trouble penetrating firm seed beds or dry soils to the desired depth. While the shoe or digger type soil openers are in general use now, I believe that the disc opener, with a little more attention paid to time of application in relation to soil conditions, will prove efficient.

In treating the subject of commercial fertilizer drill mountings, I would like to again bring out the fact that in our particular areas we have very little fertilizer placement with the seed and no separate implements, other than broadcasting equipment, for this work. All of our work has been directed toward the design of side-dressing attachments mounted on cultivators and with drills. And again the farmer steps into the picture with

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a very decided influence on design requirements. He asked for a low cost attachment for a horse drawn cultivator that would function without tying up the guide wheels of the cultivator. He brought in his tractor with the tool bar on and helped design an attachment that was quickly and easily mounted or dismounted. Some of our custom drillers asked for a side-dressing unit to be mounted on the rear of the tractor, but ahead of the drill, so that side-dressing and drill could be performed in one operation without disturbing the drilled rows. All of these machines were worked out in our shops and put into use in the fields to the very mutual satisfaction of the growers and the field staff. I would like to describe in detail these three attachments.

Description of (1) horse drawn cultivator attachment, (2) tractor mounted side-dresser for both front and rear tool bars, (3) tractor mounted side-dresser to operate ahead but with the drill.

There are some commercial drills being manufactured with side-dressing equipment. While this is a step in the right direction, none of these machines, as yet, place the fertilizer deep enough to meet our requirements.

We realize the necessity and the value of a complete commercial fertilizer program to our industry. The grower is fast moving to this realization also and will move faster as we design and build fertilizer placement machinery that will meet his requirements and will still do his job.