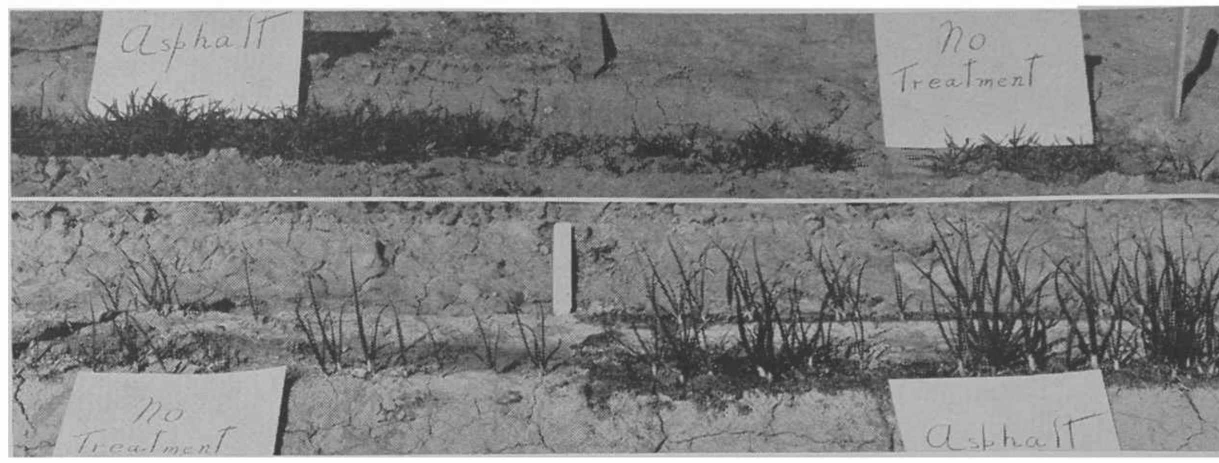
Asphalt Improves Germination, Growth Of Crops in Winter



ABOVE, winter grasses at Tucson, winter of 1960-61; below, winter onions at Tucson station.

W. I. Thomas

"Jim, when you start planting cotton today be sure to paint the rows black. And when you plant the late potatoes be sure to paint the rows white."

That conversation, in slightly varied form, might be heard five years from now. And it wouldn't be out of place in this fast-changing world of agriculture, which has seen more change in the past 50 years than in the previous 5,000.

Painting the planting surface black, thus keeping soil warm for cold season planting, looks promising at University of Arizona farms in Tucson and Mesa. The Esso Research and Engineering Company (an affiliate of Humble) is underwriting these Arizona tests. The "paint" is an asphaltic material, a petroleum product seeking new uses.

A spray attachment at the rear of the row planter applies this thin black covering of asphalt on the planted row. Already it has been shown that crops planted in cool weather will germinate sooner, have better stands and grow faster where such a strip is applied.

LATTICING of broadcast small grain plots is reflected in early growth stage. Heavier growth is where asphalt coated the seed bed.

Works With Many Crops

The results have been consistent with a variety of crops, including small grains, sugar beets, corn, cotton and more than a dozen commercial vegetable crops. In all cases, when weather during and after planting time was cool or cold, response has been favorable. Under warm conditions, such as midsummer plantings of corn and sorghum, the black asphalted strips have a killing effect as a result of too much heat. Under the latter conditions the soil temperatures can be reduced below their normal soil temperature by the use of hydrated lime.

The main principles of the asphalt strip are that black color absorbs heat and the film conserves moisture in the seedbed. This heat penetrates the soil to a depth of several inches and some of the heat will be retained in the seed zone until the early morning hours, usually the coldest part of the day. Amount of warmth varies with soil type, but a 10 degree increase at a two-inch depth over untreated soil is typical during the afternoon hours.

Desirable aspects of the black strip are many and varied. It can lengthen the growing season. It can give a better stand, more rapid early growth and increased yields. It holds moisture in the top soil.

Much To Learn

Costs of the treatment are not yet available, but already it seems that benefits will pay those costs, which should be only a few dollars per acre. Nor is it known how wide a band to use, although tests of 3 to 8 inch widths have been tried in the Arizona tests. The six-inch strip may become standard, or it may be found best to vary the width according to the crop seeded. There is much yet to learn.

Mr. Thomas is an Associate Agronomist in the Department of Agronomy.

The material used is a special asphalt formulation called EAP 2000 by Esso. The formulation can be handled at the usual air temperatures and dries quickly when applied to the seedbed, leaving a thin black film which holds moisture and absorbs solar heat. Conventional spray equipment is used to apply EAP 2000.

To do a satisfactory "paint" job with minimum use of material, the soil ahead of the spray must be as smooth as possible. Clods make for difficulty of application, and in the Arizona tests a number of implements, including clod breakers and small trowels followed by a rubber-tired packer wheel, have been tried with varying degrees of success.

The Paint Fades Away

In both cases, with asphalt and lime, no attempt has been made to remove the coating. Gradually the black (or white) strip is disturbed and obliterated. No indication of residual harm to the soil has been found.

Because cotton is Arizona's chief row crop, and cold soil during planting season early in April has been a hazard, this crop offers a real application of the asphalt stripping. There may also be possibilities for such crops as melons and lettuce, where earliness in growth of a crop may mean a premium market.

Meanwhile, trials are continuing, for there are scores of variables, of "how's" and "why's" to learn about. The smoothing of the soil without undue compaction by the packer wheel is a real problem in heavy soils. The economics of asphalt application has to be studied. Meanwhile, the heavy stands and vigorous growth of crops in the "painted" rows, compared to sparse, slow growing stands in check rows, give the UA research workers confidence that they are working on a program which may result in major benefits to agriculture.