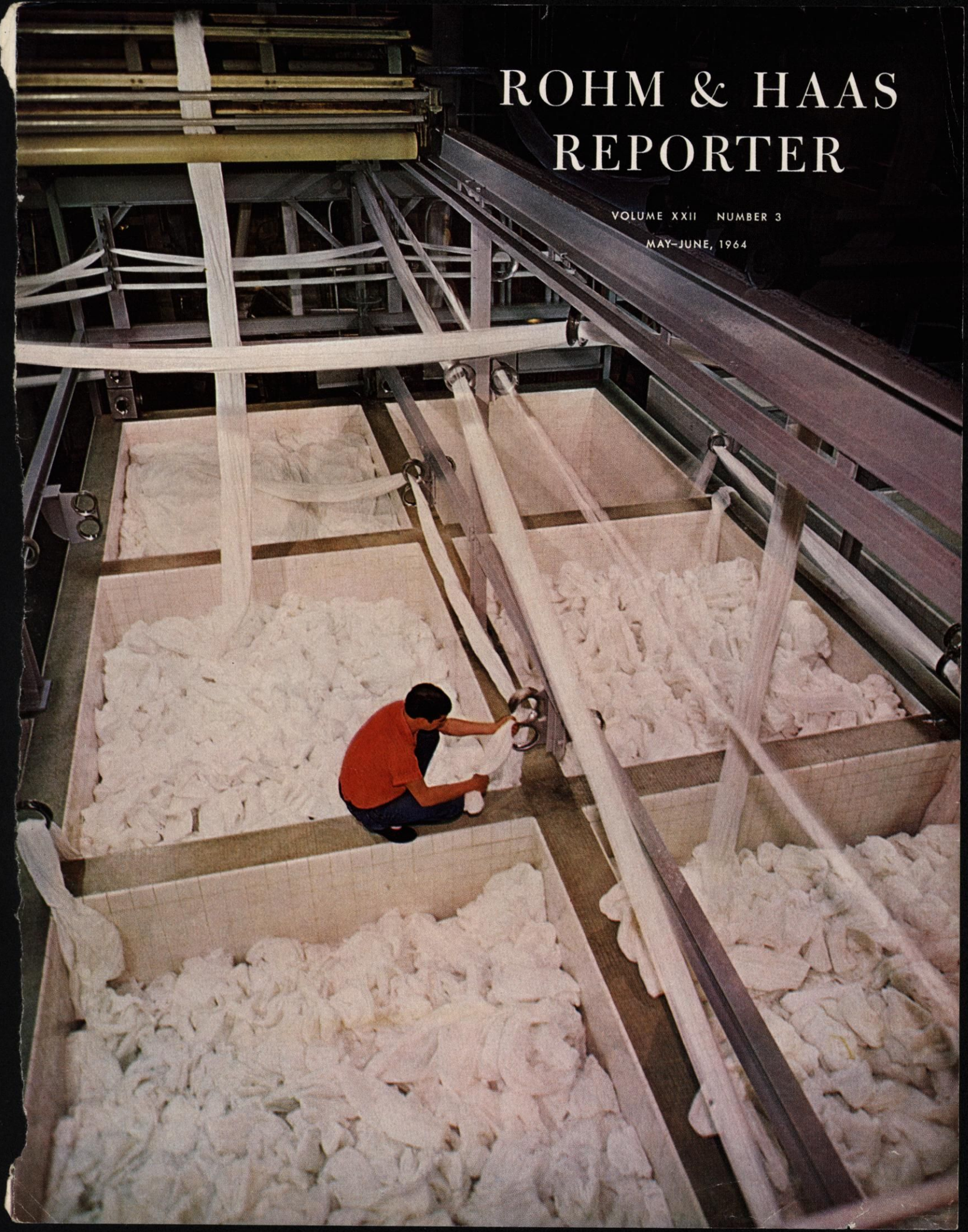

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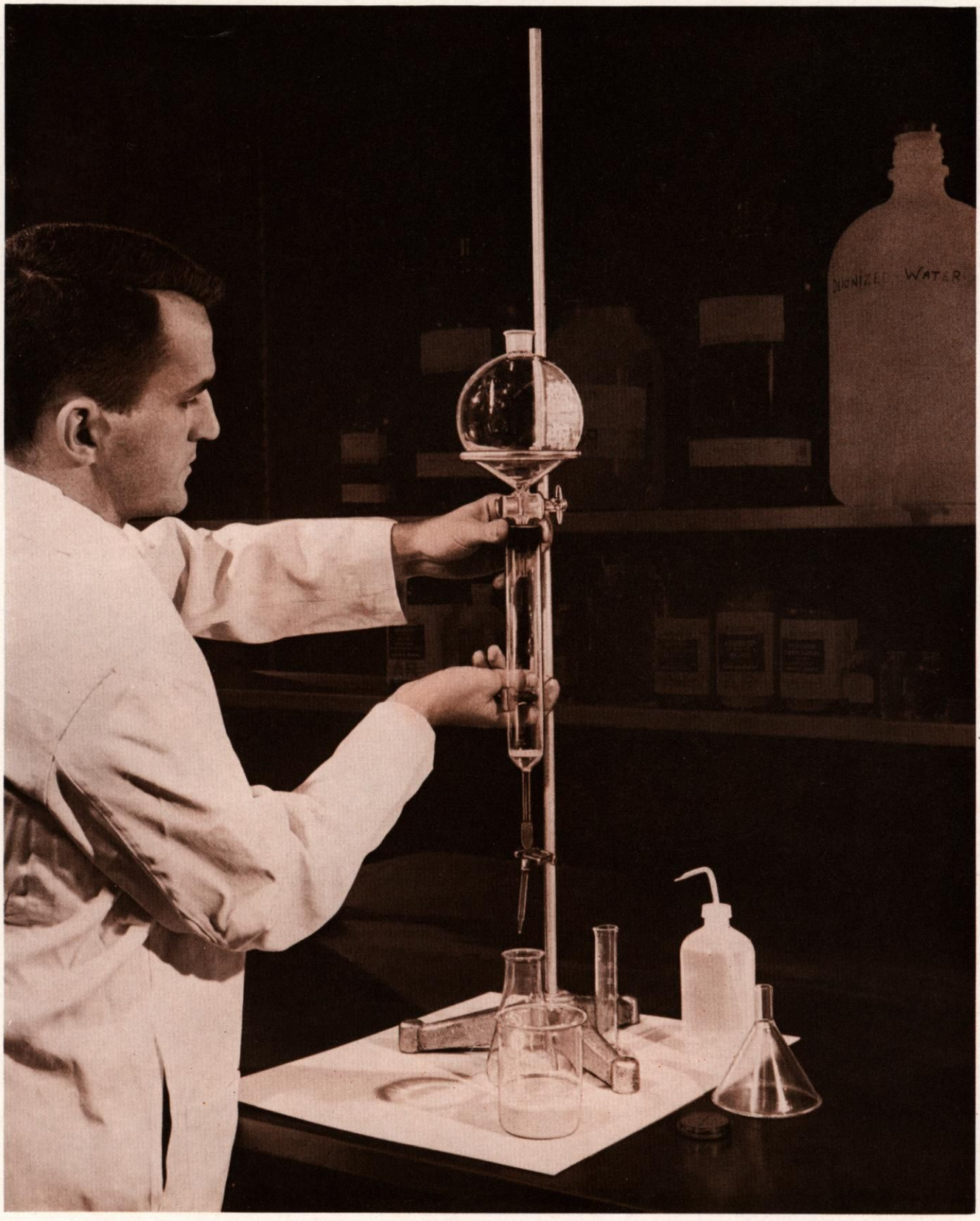

Assembling an ion exchange column for laboratory use. This illustration is from the new Amberlite Ion Exchange Resins Laboratory Guide published by Rohm & Haas (story on opposite page).

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VOLUME XXII, NUMBER 3 MAY-JUNE, 1964

Benjamin D. Allen, *Editor*
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Rohm & Haas Company Manufactures Plastics, Synthetic Resins and Other Chemicals for Agricultural and Industrial Use

CONTENTS

THE COVER

Freshly bleached cotton fabrics are held in tile-lined "white bins" at The Springs Cotton Mills finishing plant in Grace, South Carolina. This plant is part of a complex of 10 large mills engaged in the production of "Springmaid" fabrics. (Story on page 16.)

Correspondents in other countries are invited to address inquiries to our subsidiaries:

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Filibra Produtos Quimicos, Ltda., Av. Ipiranga 103, Caixa Postal 8942, Sao Paulo, Brazil.

Rohm & Haas Argentina S. A., Calle Vidt 1966, Buenos Aires, Argentina.

Industrias Quimicas Locsa, S. A., Avenida Wilson, 1218-908, Lima, Peru.

Lennig Chemicals, Ltd., 26-28 Bedford Row, London W. C. 1, England.

Minoc, s. a. r. 1, 18, Rue la Boetie, Paris 8, France.

Filital Industrie Chimiche S.p.A., Piazza Velasca 5, Milan, Italy.

Industrias Quimicas de Apizaco, S. A. de C. V. Calle Copenhague, 21-303, Mexico 6, D. F. Mexico.

Primal Chemical Pty., Limited, Coates Building, 18-22 Collins Street, Melbourne C-1, Australia.

Laboratory Guide to Ion Exchange

A NEW MANUAL titled "Amberlite Ion Exchange Resins Laboratory Guide" has been published by Rohm & Haas. The illustrated, 42-page guide is designed to help laboratory personnel use ion exchange resins easily and effectively.

The guide, which may be obtained from Rohm & Haas at no cost*, describes the many ways Amberlite ion exchange resins may be used to eliminate difficult and time-consuming steps in laboratory work and explains how ion exchange operations are carried out.

The manual emphasizes actual techniques for the use of the ion exchange process in preparative and analytical work, discussing fundamentals of ion exchange technology only where they clarify the operations involved. While primarily concerned with laboratory applications, the guide also reviews ways of using ion exchange resins in commercial processes.

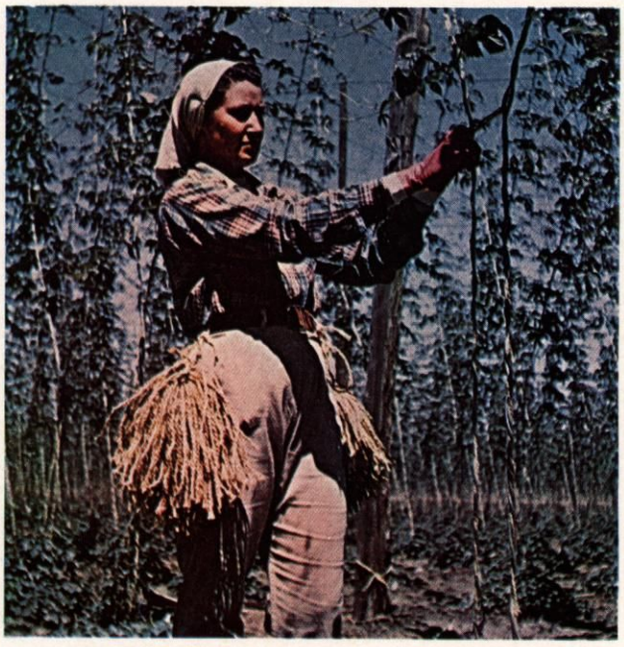
Laboratory grades of Amberlite ion exchange resins are among the most useful analytical tools available. They may be employed in such basic tasks as concentration, decolorization, deionization, fractionation and analysis and catalysis of organic and inorganic products.

The resins are also exceptionally convenient to use. Often the only equipment needed to make an analysis is a glass column containing the resin beads. Moreover, by the ion exchange process the analyst frequently can perform more rapid separations and make more accurate determinations than he could by the slow, cumbersome methods of precipitation or crystallization.

Rohm & Haas pioneered in the development of ion exchange technology. It was the first company in this country to produce synthetic, high-capacity ion exchange resins commercially. Rohm & Haas has retained its leading position as a producer of ion exchange resins and currently manufactures a complete line of laboratory and commercial ion exchange resins under the trademark Amberlite.

Amberlite ion exchange resins for laboratory use are marketed by Mallinckrodt Chemical Works, St. Louis, Missouri. The resins are supplied in two different grades: chemically pure and analytical reagent. Over 30 different ion exchange resins of various porosity and particle size are available in the grades.

*Requests for copies of "Amberlite Ion Exchange Resins Laboratory Guide" (CIE-85-64), should be addressed to Ion Exchange Department, Rohm & Haas Company, Philadelphia, Penna. 19105.



Tending the vines in a Pacific Northwest hop yard. With an annual crop of about 43 million pounds, the United States is the world's largest producer of hops.

TOPS in HOPS

A Major Share of the World's Hops — an Essential Ingredient of Malt Beverages — Comes from Yards of the Pacific Northwest

HOPS ARE A vital ingredient of beer, ale and other malt beverages. These beverages get their distinctive aroma and refreshing bitter flavor from the essential oils and resins extracted from the hop cones during the brewing process.

In producing about three billion gallons of fermented malt beverages a year, American breweries use some 30 million pounds of hops. Most of these hops are grown in this country. The United States is, in fact, the world's largest producer of hops, with production in recent years averaging around 43 million pounds. That part of the crop not needed here is exported.

Approximately 32,000 acres are under hop cultivation in this country. This is not particularly impressive when compared with national acreages of many other crops. But in certain areas, hop growing is an important and profitable agricultural activity. Value of the crop fluctuates considerably from year to year, but as a rule it exceeds $20 million. Cultivation of hops is also a complex, highly specialized type of farming, requiring special conditions and special skills.

Hops can be grown throughout the United States, but commercial production of the plant is limited to a few sharply defined areas. A durable, deep-rooted

(*Continued*)

Photograph by Don Weiss

Workers train the strongest shoots from each plant to climb the twine hanging from the high trellises that support the hop crop.

vine, the hop plant has definite preferences when it comes to soil conditions and climate. It grows best in rich, alluvial soils or sandy, well-drained loams. As for climate, hops like areas in which the temperature rises at a slow and constant rate from early spring to mid-summer and then gradually and uniformly diminishes. The plant needs an abundant moisture supply, but one that accumulates during the winter and does not come primarily from spring and summer rains. Cold spring rains adversely affect hop growth, and excessive rainfall in late August and early September may lead to heavy disease and insect damage.

Hop Producing Areas

The most favorable growing conditions exist in parts of Washington, Idaho, California and Oregon, and these states produce almost the entire U.S. crop. Washington, the largest producer, accounts for more than one-half the total acreage and output. The famed Yakima Valley in Central Washington is one of the greatest hop-producing areas. The Willamette Valley and Grant's Pass District in Oregon; the Sacramento Valley in California; and the Valley of the Snake River in Idaho are other important sources of hops.

Hops are grown from root cuttings instead of seed to ensure a crop of uniform quality, and to control the type of cone and sex of the plants. The hop is one of the few species in which male and female flowers are borne on different plants. The cones used in brewing come from the female plant, and since these may develop without fertilization the males are not indispensable to cultivation. In fact, male plants are generally undesirable since they produce seeded hops.

The hop plant is a perennial. With proper care and under favorable conditions, it will keep growing and producing indefinitely. When the root cuttings are first planted, they are generally set seven to eight feet apart. A similar space is left between rows.

In the United States, all hops are grown on trellises. These trellises are generally 18 to 21 feet high and are made of heavy poles and support wires. They must be strong to support the weight of the mature hop cones and vines. Early in each growing season, workers operating from special twining rigs attach heavy string to the wire trellises; one string is tied to a wooden peg at the base of each plant. When the shoots of the plant appear, the strongest are selected and trained individually to climb the supporting twine. Other growth is removed to permit all plant energy to flow to the producing vines.

Once they get started, hop vines grow like Jack's beanstalk. Under ideal conditions they may grow 8 to 10 inches a day—always winding in a clockwise direction. Often the vines reach a length of 25 feet.

By late August or early September the hop cones are fully mature. Now they have to be harvested quickly. Hops are in their prime condition only a few days and they must be picked during this time to maintain their attractive appearance and maximum brewing value. Mechanized equipment and round-the-clock work speed the harvest. In a typical harvest operation, trucks are driven right into the hop yard, under the tall trellises. Field workers swiftly cut the heavily laden vines from the overhead support wires. The vines fall into the waiting truck. When the truck is full, the load of vines is sped to a centrally located picking plant.

With this, the grower has done his task. But to bring the hops to this point has required ceaseless toil, all the grower's accumulated skills and knowledge, and the aid of modern technology.

The work begins in early spring, when the soil's fertility is renewed by the application of natural and chemical fertilizers and waste materials from the hop picking machines. Special disc plows then free the plant of packed soil and condition the hop yards for the pruning operation, which follows. In this operation workers armed with hoes and knives first remove the remaining packed dirt from each plant and then prune

away all unwanted volunteer shoots. After pruning, cultivation begins. It is continued almost until harvest time to keep the soil in fine, loose-grain condition. Planting replacement cuttings and new yards, stringing twine, training each vine, and bobbing off excess growth are other essential steps in the production of a crop.

At all times, the crop must also be protected against diseases and insect pests. Hops are subject to a variety of diseases, and some of these can be devastating if left unchecked. One of the diseases of most importance to hop producers is downy mildew. An example of the damage the disease can cause is provided by the experience of California hop growers in 1957. They lost approximately 30 percent of their crop to downy mildew. Losses for the entire U. S. hop crop due to downy mildew that year were estimated to be 12 percent.

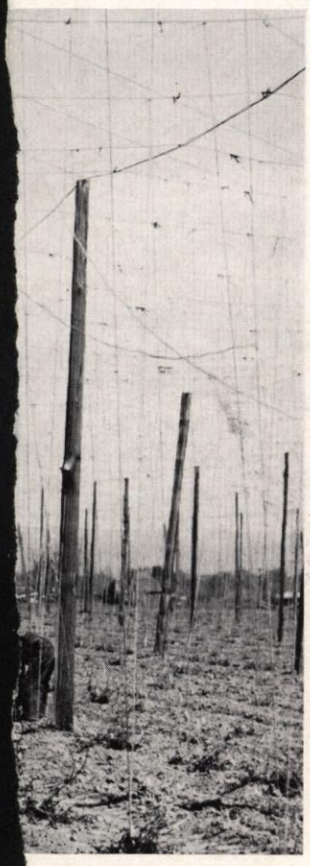
Fortunately downy mildew infection of the hop plant can now be prevented by the systematic application of Dithane fungicides developed and manufactured by Rohm & Haas. Dithane fungicides are safe and easy to use. They enable growers to produce larger yields of superior quality. In areas where disease conditions are severe, the timely use of Dithane can often make the difference between a profitable crop and costly losses. Dithane is compatible with most insecticides and nutritional sprays, and the hop grower may use it in combination sprays and dusts for multiple pest control in a single application.

In applying Dithane, many growers combine it with another Rohm & Haas product, Triton B-1956. This spreader-sticker causes the spray to spread more evenly, and prevents wasteful run-off of spray materials.

Its use on hops represents a significant specialty application for Dithane. Fungicides in the Dithane series are also widely used to control important fungus diseases on many basic food crops such as potatoes, tomatoes, onions, lettuce, beans and other vegetables, as well as certain field crops and fruits.

Insects as well as diseases pose a serious problem for hop growers. Notorious among the insects is the spider mite. It feeds by puncturing the lower leaf surfaces of the hop plant and withdrawing the sap, causing the leaves to shrivel and die. Mites also attack the cones, turn them reddish and reduce their quality. For effective spider mite control, many hop growers depend on Kelthane, a Rohm & Haas miticide. Kelthane gives a good initial kill and has long residual action. Used as recommended, it is safe on foliage and plants, and does

Left: From tractor-mounted platforms, workers tie twine to the trellises. Right: Aerially applied chemicals protect hops from insects and disease.



When the hop cones are ready for harvesting, workers cut the heavy vines from the overhead support wires. The vines then fall into waiting trucks.

not harm pollinating or beneficial predatory insects. Kelthane may be applied as a spray or dust, and is completely compatible with most pesticides used on plants. Because of its low toxicity, growers can apply Kelthane up to seven days before harvest.

Picking Stations

When the freshly harvested hops arrive at the picking stations, the vines are unloaded onto conveyors and carried past stationary picking machines. These machines are equipped with hundreds of steel fingers which strip the vines gently but quickly and completely. The leaves, hops, and small stems fall onto sorting belts and waste material is separated from the hop berries. The cleaned hops then go to drying kilns.

Newly picked hops contain 65 percent to 80 percent moisture. They are dried to approximately 10 percent moisture in the kilns. After drying they are cured for a period of from one to 12 days in cooling houses. The curing process equalizes the moisture content of the entire crop, modifies the hop aroma, and conditions the hops for baling. In this process 200-pound lots of hops are compressed into rectangular bales of approximately 18 cubic feet. These bales are wrapped in heavy burlap "hop-sacking" for shipment to breweries.

Brewmasters extract the essential oils and resins from the hops by adding the cones to the boiling "wort"—an aqueous infusion of malt. Only a small quantity of hops is needed to season the brew—about one pound to every 100 gallons. But this "kiss" is indispensable. It gives malt beverages their distinguishing taste and aroma and is one of the main reasons why these brews are among the world's popular thirst quenchers.

The vines are trucked to picking stations. Here machines with hundreds of steel fingers gently but swiftly and thoroughly remove the precious cones.