Growing Points

Agricultural Extension Service
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Alameda, Contra Costa and Santa Clara Counties

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WATER REPELLENT SOILS

Water repellent soils are soils with particular properties that prevent them from becoming wet once they have dried. Hydrophobic substances are responsible for this water repellent property. These soils should not be confused with soils having low infiltration rates associated with clay or compacted soils which either have very small pores or few pores to allow water to enter them.

Usually water repellent soils are undesirable. Water is unable to enter them which means that plants growing in these soils will not receive sufficient moisture for good growth. Special management practices must be applied to these soils before plants can be successfully grown. Only under very special conditions where water conservation is required in arid regions is water repellent characteristics desirable in soils.

Water quickly wets dry wettable soils because of the strong attraction between soil particles and water films. Water moves into the soil by capillary attraction and gravity flow. The small pores in the soil act like small tubes. Attractive forces are great in these pores which tend to pull water into them. However, if the pores become coated with hydrophobic substances, such as oil or wax, water is prevented from entering. In these soils, water enters largely by gravity flow which is relatively slow. The rate of wetting increases gradually as a head of water builds up to push the water into the dry soil. Once a soil becomes wet, whether it is a water repellent or a non water repellent soil, the rate of water entry into the soil is governed by the flow of water through the saturated soil. This is often much less than the initial flow in a wettable soil but may be about the same as the initial flow in a repellent soil.

Water repellent properties are found in California soils (1) following burns of native vegetation such as brush covered lands, (2) with high percentage of organic matter such as the peat lands of the delta or golf greens, (3) and with certain fungi growth such as fairy rings. Soils containing a high percentage of silt will also repel water when they are worked to a powder when dry. Some nursery soils have developed water repellent properties due to the large amount of peat or other organic matter added to them.

Mechanical manipulation and chemicals are used to increase the wettability of water repellent soils. Where possible water can be ponded on the surface of water repellent soils. Non wettable surface soils can be physically mixed with wettable subsoils. Chemicals such as non-ionic wetting agents can be used to increase the rate of wetting. These chemicals decrease the surface tension of water which improves wetting by affecting the air-soil-water interface at the wetting front.

THE CHART ON THE NEXT PAGE is useful in figuring amounts of material in a volume of water. For example, if the recommended dosage is 2 lbs. per 100 gallons, how much should be used for 5 gallons of spray? Answer: 1.60 ounces or 45 grams.

AMOUNT (VOLUME) OF LIQUIDS REQUIRED TO PREPARE DIFFERENT AMOUNTS OF SPRAY MIXTURES AT DIFFERENT DILUTIONS

Dilution of spray required	Recommended dosage of chemical in 100 gal water			Amount of material required to prepare spray									
				50 gal		20 gal		10 gal		5 gal		1 gal	
	c cup	pt	qt	pt	cc	pt	cc	cc	tsp	cc	tsp	cc	tsp
1-3200	0.5	0.25	0.12	0.125	59.15	0.050	23.7	11.8	2.4	5.9	1.2	1.18	0.2
1-1600	1.0	0.50	0.25	0.250	118.30	0.100	47.7	23.7	4.8	11.8	2.4	2.37	0.5
1-800	2.0	1.00	0.50	0.500	236.6	0.200	94.6	47.3	9.6	23.7	4.8	4.73	1.0
1-400	4.0	2.00	1.00	1.000	473.2	0.400	189.3	94.6	19.2	47.3	9.6	9.46	1.9
1-200	8.0	4.00	2.00	2.000	946.4	0.800	378.6	189.3	38.3	94.6	19.2	18.93	3.8
1-100	16.0	8.00	4.00	4.000	1892.8	1.600	757.1	378.6	76.6	189.3	38.3	37.86	7.7
1-50	32.0	16.00	8.00	8.000	3785.6	3.200	1514.2	757.2	153.2	378.6	76.6	75.71	15.3
1-25	64.0	32.00	16.00	16.000	7571.2	6.400	3028.5	1514.2	306.4	757.1	153.7	151.42	30.6

AMOUNT (WEIGHT) OF POWDER REQUIRED TO PREPARE DIFFERENT AMOUNTS OF SPRAY MIXTURE AT DIFFERENT DOSAGE LEVELS

Recommended dosages per 100 gal			Amount of material required to prepare spray mixture									
			50 gal		20 gal		10 gal		5 gal		1 gal	
lb	ounces oz	grams g	oz	g	oz	g	oz	g	oz	g	oz	g
0.25	4	113	2	56	0.8	23	0.4	11	0.20	6	0.04	1
0.50	8	227	4	113	1.6	45	0.8	23	0.40	11	0.08	2
1.00	16	454	8	227	3.2	91	1.6	45	0.80	23	0.16	5
1.50	24	681	12	340	4.8	136	2.4	68	1.20	34	0.24	7
2.00	32	908	16	454	6.4	182	3.2	91	1.60	45	0.32	9
3.00	48	1362	24	681	9.6	272	4.8	136	2.40	68	0.48	14
4.00	64	1816	32	908	12.8	363	6.4	182	3.20	91	0.64	18
5.00	80	2270	40	1135	16.0	454	8.0	227	4.00	113	0.80	23

CALIBRATION OF HERBICIDE SPRAYERS

Calibrating the amount of material that is applied to an irregularly shaped and undulating landscape planting is tough, but not impossible. Let's break it down.

Weed Control in Street Trees and Row Plantings

It is important that the spray nozzle move at a constant speed. The amount of solution and spray concentration must also be known. This is relatively easy. Figure the amount of material and volume of spray per acre. Get the amounts from the registration label on the container or from University recommendations. The volume of spray is usually 50 or 100 gallons per acre; it could be any amount.

Break the per acre (43,560 sq. ft.) information into rates per 100 square feet. Fifty gallons per acre equals approximately one pint per 100 square feet. Stop right here and practice. Using a watch with a sweep-second hand or a stop watch, practice spraying out one pint in 100 square feet and note the time it takes. For large sprayers, multiply the volume and area. Move at a constant rate and pressure. Do not spray over an area already sprayed.

Once the spray applicator is confident he can maintain this constant nozzle speed and pressure, mix up larger volumes and go to work. A supervisor, noting the seconds per 100 square feet, can easily check the applicator.

Spot Weed Control on Level Ground

Follow the same procedures for calibration. Make sure the nozzle control valve is working right. The applicator should travel with the same constant speed and pressure. With the valve closed just travel by the areas to be missed, opening the valve when needed. The difference is the amount of valve work.

Spraying Up and Down Slopes

There are no pat answers. Any pattern should work if nozzle speed and pressure are kept constant. Moving on the contour minimizes problems of inconsistency.

Herbicide Problems

Landscape managers today couldn't get along without using herbicides. Yet, it's unusual to not have herbicide problems. These points may help.

* One man or crew adapted and trained to careful work should do all herbicide control work.

* Most herbicides are potent - a little goes a long way. Spraying back-over or standing still with the nozzle open can multiply problems by the second.

* Strainers should be used and kept clean. All strainers should be 50 mesh or larger.

* Check nozzles, but never use a metal object to clean them; to do so results in different spray rates. To check all nozzles for flow rate, direct nozzle flow into a marked bottle (baby formula bottle type) for 30 seconds. Replace nozzle if uneven flow is noted. For complete coverage broadcast applications, the flat-fan Teejet® 8003 or 8004 nozzles, or equivalent from other manufacturers are recommended. If you plan single-band incorporation work, use even-flow, flat-fan Teejet® 8003E or 8004E nozzles or equivalent.

* To avoid misses and to get the right application pattern, adjust height of boom and nozzles so that it is at a constant height above the ground.

* Don't let the spray tank become cruddy; clean out scale and sediment and check sprayer for over-all operations.

MEASURING TANK VOLUMES

Want to know the volume of a partially-full spray tank? If the tank does not have an accurate gauge, calibrate a dip stick by notching it at 5 gallon levels. This is

done by starting empty and adding 5 gallons at a time, marking each level. Keep the dip stick with the sprayer to use in all filling and mixing operations. Slipping it into a length of discarded fire hose which has been attached to the sprayer protects the stick.

Using a sight gauge on the outside of the spray tank is another way of measuring volumes. This gauge (like those on restaurant coffee makers) can be made using clear Fygon tubing. The vertical-tube gauge is attached through the spray tank from the bottom to the top and gives an instant reading. Gallonage markings can be painted on the tank next to the sight gauge.

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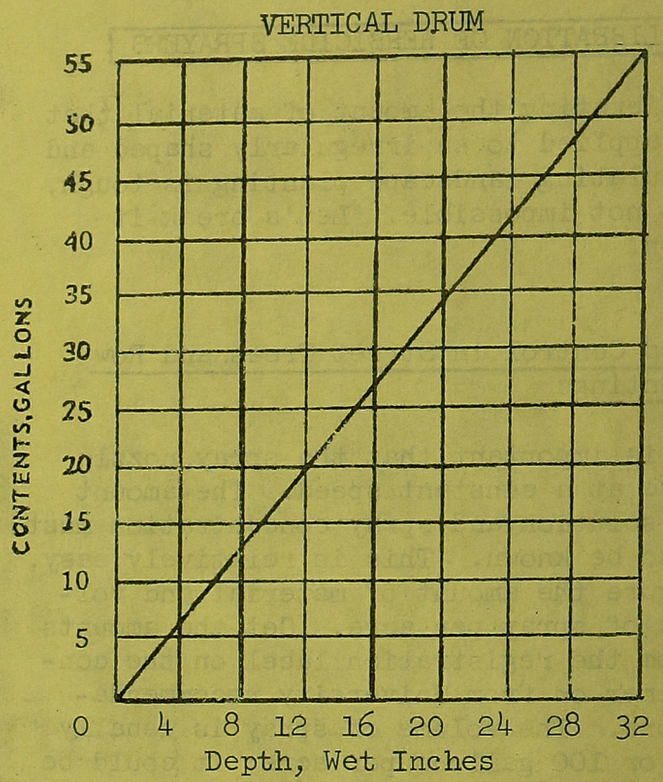
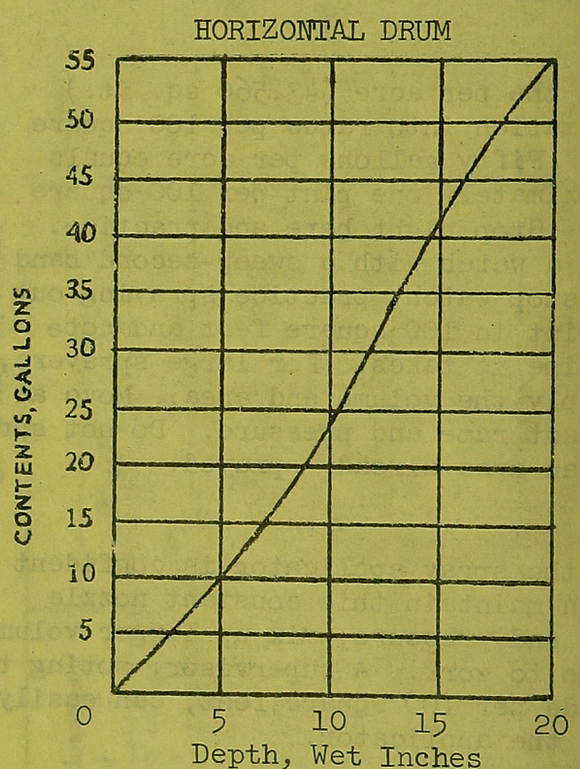
NEW CALIBRATION PUBLICATION

Calibration of Herbicide Sprayers, AXT 327, is the name of a new UC publication by Extension Agricultural Engineer, Robert W. Brazelton. Information from this publication was incorporated in the above articles. Call any UC Agricultural Extension office should you wish a copy.

MEASURING SOLUTIONS IN A STANDARD DRUM

Standard 55-gallon drums are frequently used for small batches of spray solutions. Here is a quick method of telling how much you have. Lower a yard stick, which is held vertically, to the bottom of the drum. Read the depth in inches on the wetted stick. Apply the reading to the scale on this page.





PESTICIDE RESIDUES ... These recommendations are based on the best information currently available for each pesticide listed, and treatments based upon them should not leave residues exceeding the tolerance established for any particular chemical. To avoid excessive residues, follow directions carefully with respect to dosage levels, number of applications, and minimum interval between application and harvest. THE GROWER IS LEGALLY RESPONSIBLE for residues on his crops as well as for problems caused by drift from his property to other properties or crops.

Kenneth D. Gowans

Kenneth D. Gowans
Farm Advisor
Alameda County
224 W. Winton Ave.
Hayward, CA 94544
(415) 357-0844, Ext. 341

W Douglas Hamilton

W. Douglas Hamilton
Farm Advisor
Alameda County
224 W. Winton Ave.
Hayward, CA 94544
(415) 357-0844, Ext. 341

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