

SODIUM DALAPON - - *Grass Killer*

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SUMMARY

Sodium dalapon in water is an outstanding grass-killer. Texas farmers use this herbicide mostly for controlling Johnsongrass and Bermudagrass along fences, roads and ditches and for spot-spraying Johnsongrass in cotton. Home owners and others also use it for controlling nutgrass.

Dalapon sprays, with and without sodium TCA, have been used at College Station since 1953. Spraying in non-crop areas ordinarily was with a quick-acting power spraygun controlled by the driver of a pick-up truck or tractor or by a man on foot. Non-selective spraying in cotton was mostly with a Texas Slidegun, but sometimes men walking behind a tractor sprayer used power sprayguns. Selective spraying in cotton usually was with a Texas Jetgun.

Spraying non-crop infestations of these grasses was most practical when it was used to supplement tillage or mowing, or was used to treat spotted stands and infested sites inaccessible for mechanical control. Costs for broadcast spraying of large acreages were prohibitive.

Treating spring growth, about 10 inches tall but before the boot stage, with 20 pounds of dalapon in 100 gallons of water was most effective for controlling Johnsongrass on non-crop sites. Three or four applications at about 10-day intervals ordinarily eradicated the grass at a cost of about \$50 a mile for a 4-foot strip.

A 30-pound dalapon spray, or a mixture of 20 pounds of dalapon and 40 of TCA in 100 gallons of water, was more reliable for treating Johnsongrass after the boot stage of growth. Eradication usually required three to five treatments and cost \$75 to \$100 a mile.

A 20-pound dalapon spray was effective for treating fresh growth of undisturbed Bermudagrass and usually eradicated the grass after three applications 10 to 14 days apart. Costs for this treatment were similar but usually lower than for eradicating 10-inch Johnsongrass. A 30-pound dalapon spray or the dalapon-TCA mixture was more reliable for treating rank growth of succulent Bermudagrass.

A 40-pound dalapon spray was most effective for treating spotted stands of nutgrass and infestations around structures. Four or more applications at intervals needed to keep the nutgrass killed to the ground were required for eradication. Costs for this treatment were high and varied widely.

Non-selective, spot-application of dalapon sprays in cotton was used for rapid eradication of

Johnsongrass infestations occupying 10 percent or less of the row space and mostly in widely scattered small clumps. Ordinarily, this cost \$3 to \$8 an acre. Cotton in the treated spots was killed by the first spraying. Treating the grass at or prior to the 10-inch stage of growth was less hazardous to cotton plants around the spots than treating taller grass. A spray containing 20 pounds of dalapon and 40 of TCA in 100 gallons of water killed the grass promptly, and, under favorable rainfall conditions, eradicated or nearly eradicated it after a single treatment.

Selective application of dalapon spray was used to treat 3 to 5-inch Johnsongrass sprouts left in the cotton row after cultivation. Only an occasional cotton plant was accidentally killed by such treatments. Ordinarily, eradicating infestations of 10 percent or less by this method cost \$9 to \$18 an acre when 20 pounds of dalapon in 100 gallons of water were applied, and \$6 to \$12 an acre when a 10-pound dalapon spray was used. The safe and economical limit for this practice was about a 20 percent infestation.

THE COVER PICTURE

This power spray rig can be used for selective or non-selective spot-spraying of sodium dalapon in cotton for eradicating Johnsongrass. It is adapted easily for spraying non-crop infestations by replacing the boom with a spray gun on a long hose.

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SODIUM DALAPON - - *Grass Killer*

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SODIUM DALAPON, a water soluble salt, is an outstanding grass-killer but it also stunts, defoliates or kills many other plants. Commonly used sprays of this herbicide are too weak to kill broadleaf weeds consistently, yet are hazardous for use in many crops. Dalapon kills most any grass, but is used in Texas mostly for controlling Johnsongrass and Bermudagrass along fences, roads and ditches and for spot-spraying Johnsongrass in cotton. Home owners and others also use this herbicide for controlling nutgrass. Dalapon is safe and reliable for these uses under a moderate range of conditions.

Dalapon is primarily a translocated herbicide, but moderate to strong dalapon sprays kill tender foliage and stems on contact and have significant residual effects in the soil for a few weeks. These secondary effects frequently complicate the efficient and safe use of this herbicide.

Warm, moist conditions favor rapid growth of plants and maximum translocation of dalapon. These conditions prevail most frequently in Texas during April and May. Translocation in a plant starts soon after it is sprayed with this herbicide, but reaches a maximum only after several days. Low temperatures, dry weather, slow growth of plants due to age and other causes, killing foliage of treated plants too rapidly and rain too soon after spraying interfere with the translocation of dalapon.

Sodium dalapon is sold as an 85 percent formulation. The label on the commercial formulation cites several uses for dalapon that are not discussed here. Commercial dalapon retails currently for about \$1.15 a pound in 50 pound lots. Ordinarily, this is too high for economical broadcast treatment of extensive acreages of perennial grasses. However, efficient use of this herbicide with and without the addition of sodium TCA, has been made at College Station since 1953 for controlling spotted infestations and limited acreages of these grasses on non-cropland and for spot-spraying Johnsongrass in cotton.

METHODS USED

Spraying in non-crop sites at College Station usually was with a quick-acting power spraygun controlled either by the driver of a tractor or a pick-up truck or by a man on foot using about 150 feet of hose.

Both non-selective and selective spraying was done in cotton. Non-selective spraying was mostly with a Texas Slidegun or with short power spraylines operated by men on foot behind a tractor sprayer.

Selective spraying ordinarily was with a Texas Jet-gun.

Sight judgment of spray coverage and concentration of the spray were the guides used for dosage in treating the grass. Spray concentrations cited here are in pounds of commercial dalapon (85 percent sodium dalapon) and TCA (90 percent sodium trichloroacetate) in 100 gallons of water. Dalapon acts through the foliage of plants, while TCA, mostly, must be taken up from the soil by roots. Rain, usually within 2 weeks after application, is needed to activate TCA in the soil. Sodium TCA retails for about 40 cents a pound.

The effectiveness of sprays containing dalapon sometimes is increased by adding 2 pounds of dry detergent to 100 gallons of the spray (2 tablespoons in 5 gallons). Such additions were made to most of these sprays at College Station.

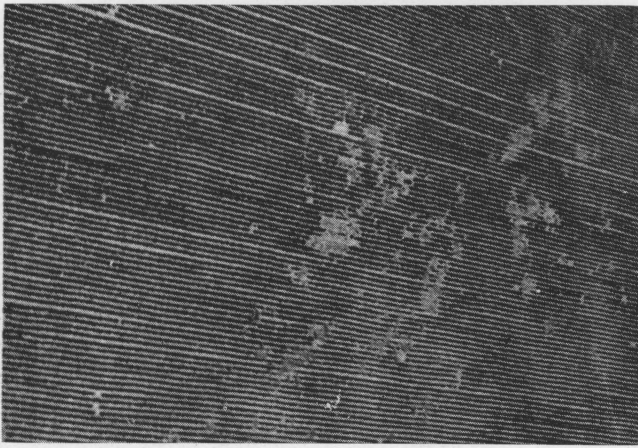
Infestations of Johnsongrass, Bermudagrass and nutgrass with well-developed rootstocks, rhizomes and tubers, respectively, were sprayed. These grasses were growing on alluvial soils in the Brazos River Valley at College Station. Treatment and control of their seedlings were incidental. Johnsongrass, which was most prevalent locally, was sprayed under a wider range of conditions than Bermuda and nutgrass. Young Johnsongrass plants arising from rootstocks are called sprouts to distinguish them from seedlings. Similar differentiations for Bermuda and nutgrass are impossible. Nutgrass is a sedge, but is commonly called a grass.

RESULTS OBTAINED

A spray containing 20 pounds of commercial dalapon in 100 gallons of water (1 pound in 5 gallons) was used most commonly, and it eradicated Bermudagrass, Johnsongrass and nutgrass, in that order, when mixed infestations were sprayed. Good growing conditions, thorough spraying of tender vegetation and two or more applications of this spray 7 to 10 days apart were needed for eradicating these grasses. The number of treatments required varied from one infestation to another and for the individual grasses. Sometimes only two but mostly three treatments were needed for Bermuda, usually three or four but sometimes five for Johnsongrass and mostly four or more for nutgrass.

Johnsongrass

Johnsongrass treated with dalapon showed a wide range of symptoms. These varied with the concentration of the spray and the age of the grass. Sprays



Wet small Johnsongrass spots in cotton thoroughly with a mixture of 20 pounds of dalapon and 40 of TCA in 100 gallons of water for eradication after one to three treatments. Confine this practice to infestations similar to the one shown in this aerial view. Expect the first spraying to kill cotton in the treated spots.

containing 10, 20, 30 and 40 pounds of dalapon, and a mixture of 20 pounds of dalapon and 40 of TCA, respectively, in 100 gallons of water were used under one or more conditions. Johnsongrass from 3 inches to 5 feet tall was treated with one or more of these sprays.

Leafy Grass

Efficient absorption and translocation of dalapon was favored by spraying leafy Johnsongrass about 10 inches tall. This was younger Johnsongrass than normally is hoed out of cotton or mowed for premium hay, but was the best stage of growth for spraying non-crop sites and for non-selective spot-spraying in cotton.

Johnsongrass sprayed at this stage with 20 pounds of dalapon in 100 gallons of water did not show conspicuous effects of the treatment for 2 or 3 days, but



Three or four applications of 20 pounds of dalapon in 100 gallons of water to wet 10-inch grass thoroughly in the spring at about 10-day intervals eradicates Johnsongrass. Three did it on both ends of this fence. Regrowth after three hand-hoeings is shown in the middle. A 30-pound dalapon spray or a mixture of 20 pounds of dalapon and 40 of sodium TCA in 100 gallons of water is more reliable after the boot stage.

ordinarily most of the tops were killed within 10 days and subsequent sprouting was suppressed. Additional applications of this spray at about 10-day intervals reduced stands and usually eradicated the grass after three or four sprayings. Weaker dalapon sprays were not used to treat Johnsongrass at this stage of growth.

Spraying 10-inch Johnsongrass with 30 to 40 pounds of dalapon in 100 gallons of water killed the tops faster, affected the rootstocks more drastically and frequently eradicated or nearly eradicated the grass with one or two fewer treatments than a 20-pound dalapon spray. However, the stronger sprays were more expensive to use.

Some of the intermediate effects of a 20-pound dalapon spray on 10-inch Johnsongrass influenced the success of the treatment. Translocation of dalapon to buds on the rootstocks of the grass occurred before the tops died. Buds nearest the crown of the plant and those least active were severely injured and soon became dry husks on otherwise normal rootstocks. Buds remote from the crown of the plants and those growing rapidly usually survived and soon emerged as new sprouts which had to be sprayed. Partially affected stems, sprouts and buds were stunted and early growth from them was distorted, but recovery usually followed unless the new growth was sprayed. Cutting off stunted or distorted stems and sprouts or killing them with a contact spray stimulated resprouting from surviving rootstocks. Partially affected rootstocks were hard and fibrous, but remained alive for a long time. Cutting such rootstocks away from the crown of the plant without exposing them to drying induced subsequent sprouting. Severely affected rootstocks died fairly soon after the sprayed tops died.

Short Grass

Treating Johnsongrass on non-crop sites with dalapon prior to the 10-inch stage of growth usually was inefficient. However, treating the grass while it was still young was critical for selective spraying with dalapon in cotton. The height of the cotton and wind conditions determined the maximum height of grass that could be treated safely. Spraying foliage of grass in the row that was as tall or taller than the cotton was hazardous, especially on windy days. Selective spraying of Johnsongrass sprouts 3 to 5 inches tall with dalapon was effective and safer than treating older grass in cotton. The opportunities for selective spraying of Johnsongrass sprouts with dalapon in young cotton varied from season to season, and in different fields. Sometimes, the crop emerged ahead of the Johnsongrass and selective spraying with this herbicide could be started before the cotton was thinned. At other times, the first selective application of dalapon had to be delayed until after the first or second hoeing. Dalapon was much more effective than hoeing, even with a late start, and ordinarily eradicated the grass when the initial and subsequent sprayings were done promptly.

Selective spraying of Johnsongrass in cotton was most effective when dalapon for foliage application and crown oiling were used as optional practices. Dalapon usually eradicated the grass after fewer treatments and a weak dalapon spray was cheaper than a mixture of half-naphtha and half-diesel fuel oil. However, crown and basal applications of an oil spray were safer under a much wider range of conditions than foliage application of dalapon.

A concentration of 10 pounds of dalapon in 100 gallons of water was the most economical spray used for selective treatment of 3 to 5-inch Johnsongrass in cotton when labor for hand spraying cost about 50 cents an hour. Two sprayings 7 days apart were needed to kill the tops and to suppress resprouting. At least three and more commonly four or five applications were needed for eradication.

The effects of a 20-pound dalapon spray on 3 to 5-inch Johnsongrass were similar to those on 10-inch grass and were more drastic than those of a 10-pound spray. Keeping new Johnsongrass sprouts treated was easier with the stronger spray and its use frequently was preferred, even at a higher cost.

Selective spraying of 3 to 5-inch Johnsongrass sprouts in cotton with 40 pounds of dalapon in 100 gallons of water was too hazardous to be continued beyond 1 year. The effects of this spray were drastic on the grass and on adjacent cotton plants.

Tall Grass

After Johnsongrass was more than 10 inches tall, it became increasingly stemmy and less susceptible to dalapon. The economy of spraying rank Johnsongrass with this herbicide is questionable when the grass can be mowed, shredded or plowed up. The volume of spray needed for good coverage of the grass increases rapidly with increases in its height and age. However, Johnsongrass more than 3 feet tall, and sometimes past the bloom stage, can be killed with dalapon if the grass is succulent and is sprayed thoroughly.

Treating Johnsongrass taller than 10 inches and prior to heading was mostly for controlling non-crop infestations and for emergency non-selective spot-spraying in cotton fields predominantly infested with widely scattered small clumps of the grass. Treatment of older grass was confined to emergency spraying along fences, ditches and the ends of rows of mature or nearly mature crops.

A spray containing 20 pounds of dalapon in 100 gallons of water usually was satisfactory for treating Johnsongrass up to the boot stage when the grass was fairly succulent. A 30-pound dalapon spray, or a mixture of 20 pounds of dalapon and 40 of TCA in 100 gallons of water, gave better results for treating older and less susceptible grass. Eradicating such grass usually required three to five treatments. A 40-pound dalapon spray costs about the same, but was less reliable than the dalapon-TCA mixture. Dalapon sprays or mixtures containing dalapon gen-



Use sodium dalapon for controlling Johnsongrass, Bermudagrass and nutgrass in non-crop sites and for spot-spraying Johnsongrass in cotton. Spray young grass early in the season before it gets this rank. Treating tall vegetation such as is shown here is inefficient. Broadcast spraying of extensive acreage is too expensive.

erally were wasted when tall Johnsongrass with partially dried foliage was treated.

Bermudagrass

Bermudagrass along pasture fences, roads and ditches commonly invades the edges of fields in the Brazos River Valley at College Station. This grass makes a desirable cover in many areas adjacent to fields, but keeping it in bounds is a recurrent problem unless an undisturbed sterile soil barrier 4 to 6 feet wide around a field is provided.

Plowing, disking and blading generally are used along the exposed margins of fields to suppress the invasion of Bermuda and the persistent use of these practices is the cheapest way to keep this grass out of a field. Apparently, many farmers are too busy to do this consistently. Consequently, Bermudagrass spreads and persists when tillage is intermittent.

The help of dalapon sprays to supplement tillage for controlling such Bermudagrass infestations has been used for several years. A spray containing 20 pounds of dalapon in 100 gallons of water ordinarily



Respray as needed to kill stray Johnsongrass plants missed or sprayed poorly the first time.



Applying dalapon to Johnsongrass foliage as tall or taller than the crop is impossible without killing the cotton. Kill the Johnsongrass sprouts shown here by crown-oiling or hoeing and use dalapon to treat 3 to 5-inch grass after the cotton is 10 inches tall. The wand of a Texas Jetgun used for selective spraying in cotton is shown above this row.

was satisfactory for treating fresh new growth of short Bermuda in recently tilled areas. A 30-pound dalapon spray or a mixture of 20 pounds of dalapon and 40 pounds of TCA in 100 gallons of water gave better results for treating older grass with a dense stand and for treating grass that had not been disturbed for several years.

Several days were required for dalapon to kill Bermuda to the ground, but there were no important intermediate symptoms. The tops of the treated grass were either alive or dead. Inadequate coverage for short Bermuda was shown primarily by the survival of runners along the margins of treated spots. These runners remained conspicuously green and it soon was obvious that they had never been sprayed. Poor coverage of dense stands of old grass showed up mostly by the persistence of the green color in stems near the ground. These stems probably were protected by the foliage above them. At any rate,



Left—Johnsongrass eradicated by two selective applications of a 20-pound dalapon spray to 3 to 5-inch Johnsongrass starting shortly after the second hoeing. Right—Growth of untreated Johnsongrass after two hand-hoeings.

respraying two or three times was needed to eradicate such infestations.

In undisturbed areas of short Bermuda, the regrowth from rhizomes surviving the first treatment showed up as small, widely scattered green tufts occupying only a very small fraction of the areas previously infested. Some of these tufts usually continued to appear until after the third spraying. Ordinarily survival was greater in disturbed areas and was influenced by the extent to which rhizomes were covered, but not killed, by tillage. Treatment of partially dormant Bermudagrass with dalapon sprays was seldom effective.

Nutgrass

Nutgrass is widely distributed, but commonly ignored, in the Brazos River Valley at College Station. It does not interfere seriously with most of the crops grown in this valley, particularly after they begin to shade the ground. It is most objectionable around structures, in fence corners and in non-tilled areas that have been cleared of other vegetation.

Tops of nutgrass sprayed with 20 pounds of dalapon in 100 gallons of water turned yellow in a few days and usually died in 10 or 12 days. Subsequent sprouting from the primary tuber (active) was suppressed but secondary tubers (dormant) were not affected. Sprouts from secondary tubers required subsequent treatment. Ordinarily, four or more applications of this spray were needed for eradication. This varied from one infestation to another and depended on the time it took the dormant tubers to sprout. A spray containing 40 pounds of dalapon in 100 gallons of water killed the tops of nutgrass faster than the 20-pound treatment. The first treatment also killed a high percentage of the primary tubers and suppressed sprouting from many of the secondary tubers. This reduced the amount of spray needed for the second and subsequent treatments. Other sprays containing dalapon were not used consistently enough for treating nutgrass to determine their reliability.

COSTS

Eradicating thick stands of Johnsongrass on non-cropland with any spray was expensive, regardless of the herbicides used. Tolerating the grass, eradicating it about every 2 or 3 years with a soil sterilant or getting rid of the initial stand with a dalapon spray and using a maintenance spray thereafter, usually were the only options on sites seriously exposed to invasion and inaccessible for mowing and tillage.

Eradicating a thick stand of 10-inch Johnsongrass in a 4-foot strip in a mile of fence sometimes cost as little as \$30, but more commonly \$50 or more when a man on foot using a quick-acting power spraygun treated the grass with a 20-pound dalapon spray or a mixture of 20 pounds of dalapon and 40 of TCA in 100 gallons of water. These and other costs cited

include labor for spraying at 50 cents an hour. Eradicating similar infestations of 3-foot grass cost about \$75 and 5-foot grass about \$100 when a 30-pound dalapon spray or the dalapon-TCA mixture was used. Costs for eradicating spotted infestations and those reduced by tillage prior to spraying were considerably lower.

Costs for controlling dense stands of undisturbed Bermudagrass were similar, but usually lower, than for eradicating 10-inch Johnsongrass. Costs for eradicating nutgrass in the small areas were high and varied widely.

Non-selective spot-spraying in cotton usually cost \$3 to \$8 an acre for eradicating infestations of 10 percent or less when 10-inch Johnsongrass was treated with 20 pounds of dalapon and 40 of TCA in 100 gallons of water.

Costs for selective spraying of young Johnsongrass sprouts interspersed in the row with cotton varied with the intensity of the infestation, the persistence of the grass and the spray used. Ordinarily, eradicating infestations of 10 percent or less cost \$9 to \$18 an acre when 20 pounds of dalapon in 100 gallons of water were applied, and \$6 to \$12 when 10 pounds were used. Near eradication of a 15-percent infestation in 1956 with a 10-pound dalapon spray cost only about \$12 an acre. Similar control of a 50-percent infestation in 1957 with a 20-pound spray cost \$22.50. Eradicating a stubborn 85-percent infestation and controlling seedling Johnsongrass in 1958 with a 10-pound dalapon spray cost about \$29 an acre, and, with a 20-pound spray, about \$43.

CAUTIONS

Sodium dalapon is among the safest herbicides to handle. However, it does chap skin, irritate the eyes, corrode metal and clog spraying equipment that is neglected. Adding sodium TCA to the spray mixture intensifies these effects. These herbicides must be kept off of vegetation that is not to be killed. Heavily treated soils under normal rainfall conditions also may retain amounts of dalapon that are harmful to plants for 4 weeks and of TCA for 4 months.

RECOMMENDATIONS

Use dalapon sprays for controlling spotted infestations of Johnsongrass, Bermudagrass and nutgrass and limited acreages of Johnsongrass on non-crop sites. Also use them for selective spraying and non-selective spot-treatment of Johnsongrass in cotton. Use a mixture of dalapon and TCA for non-selective spraying of these grasses when rapid eradication is desired. Dissolve dalapon and TCA completely in water before mixing them or adding them to a sprayer half-full of water. Agitate the spray mixture as the tank is being filled.

After the tank is partially full, add 2 pounds of a dry detergent to 100 gallons of all sprays containing



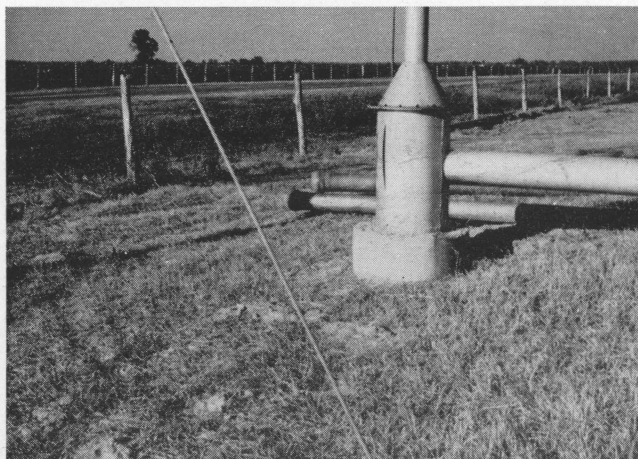
Spot-spray regrowth of Bermuda after tillage with 20 pounds of dalapon in 100 gallons of water. Use a 30-pound spray for treating growth such as shown in this fence. Expect eradication after three or more applications 10 to 14 days apart.

dalapon. Such additions are cheap and frequently improve the effectiveness of water sprays applied to the foliage of plants.

Use concentration of the spray and sight judgment of spray coverage as guides for dosage and wet thoroughly all vegetation to be killed by sprays containing dalapon.

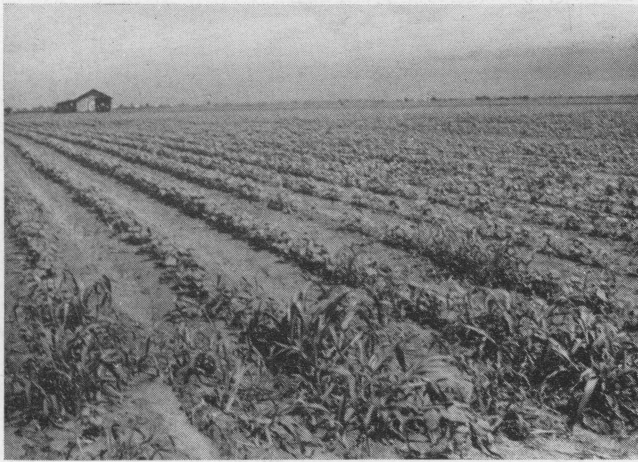
Spraying Non-crop Sites

For most economical control of spotted infestations of Johnsongrass, Bermudagrass and nutgrass, and for limited acreages of Johnsongrass on non-crop sites, use sprays containing dalapon to supplement mowing, shredding, disking, plowing and blading or for treating grass that cannot be controlled satisfactorily by such mechanical practices. Apply the spray with a quick-acting power spraygun operated from the seat of a motor vehicle when this is practical. Otherwise, apply the spray from the ground with a quick-acting power spraygun on the end of about 150 feet of hose from a power sprayer.



Treat pure and mixed stands of nutgrass around structures and on similar sites with 40 pounds of dalapon in 100 gallons of water. Spray four or more times as needed to stop re-sprouting of this pest.

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Make non-selective spot-applications to 10-inch Johnsongrass, such as is shown here, and avoid wind for safety to cotton around the spot. Start earlier and spray 3 to 5-inch Johnsongrass sprouts one at a time to save the cotton in such spots.

Treat spring growth of Johnsongrass about the time it is 10 inches tall, but before the boot stage of growth, with 20 pounds of dalapon in 100 gallons of water. Expect eradication of the grass from rootstocks after three or four applications about 10 days apart, but use additional applications of dalapon or other sprays as needed to prevent reinfestation by seedlings. Expect to use four or more applications of this spray on flush regrowth of Johnsongrass after mowing for eradication of this grass after June 1. Use 30 pounds of dalapon in 100 gallons of water for spraying succulent Johnsongrass after the boot stage. Spray rank growth of succulent Johnsongrass only in an emergency and use a mixture of 20 pounds of dalapon and 40 of TCA in 100 gallons of water for most reliable control when rain within 2 weeks after spraying can be expected. Do not expect any spray containing dalapon to control rank growth of Johnsongrass with partially dried foliage.

Treat fresh growth of Bermudagrass with 20 pounds of dalapon in 100 gallons of water. Expect eradication in undisturbed areas from treatment in this stage of growth after three sprayings at intervals of 10 to 14 days, depending on growing conditions. Expect to use more than three applications of this spray when it is used to supplement tillage. The grass that is covered, but not killed, by tillage cannot be sprayed until it emerges. Use 30 pounds of dalapon or a mixture of 20 pounds of dalapon and 40 of TCA in 100 gallons of water for spraying rank growth of succulent Bermudagrass. Use the dalapon-TCA mixture only when rain can be expected within 2 weeks after treatment. Do not treat dormant or partially dormant Bermudagrass with dalapon sprays.

Confine the treatment of nutgrass with dalapon sprays primarily to spotted infestations and to restricted areas around structures and other sites inaccessible for tillage. Use 40 pounds of dalapon in 100 gallons of water for most reliable eradication

after four or more applications at intervals needed to keep the nutgrass killed to the ground. See Extension Leaflet 425 for information for controlling nutgrass on other sites.

Spraying in Cotton

For rapid non-selective spot-treatment of Johnsongrass in cotton apply sprays containing dalapon with a Texas Slidegun, a commercial back-pack hand sprayer or with quick-acting hand guns operated by men walking behind a tractor sprayer. Treat infestations of 10 percent or less that are mostly in widely scattered small clumps of grass. Spray the Johnsongrass by the time it is 10 inches tall for most satisfactory control and for safety to cotton plants around treated spots. Expect the cotton in the treated spots to be killed by the first spraying. Do not expect good control from spraying grass older than the boot stage. Use a mixture of 20 pounds of dalapon and 40 of TCA in 100 gallons of water for a chance to eradicate the Johnsongrass with one treatment when rain follows spraying within 2 weeks. Do not be disappointed if a second or third application of this spray is needed to eradicate the grass. Use 20 pounds of dalapon in 100 gallons of water to treat the Johnsongrass when a cheaper spray per gallon is desired. Expect to use at least three but mostly four applications of this spray for eradication.

Use selective spraying of dalapon for controlling Johnsongrass sprouts 3 to 5 inches tall interspersed in the row with cotton only in fields with an infestation of 20 percent or less. Do not attempt to spray selectively Johnsongrass sprouts that are as tall or taller than the cotton and do not spray when it is windy. Cut the grass away from the cotton by cultivating as close to the drill as possible before spraying is started. Apply the spray with a Texas Jetgun or its equivalent. Treat the Johnsongrass sprouts one at a time and expect to save a good stand of cotton. Start spraying prior to hoeing when the cotton emerges ahead of the Johnsongrass. Otherwise delay spraying until 3 to 5 days after the first or second hoeing.

Use 10 pounds of dalapon in 100 gallons of water for the most economical selective spraying of young Johnsongrass sprouts in cotton when labor for hand spraying costs 50 cents an hour or less. Expect to use two applications about 7 days apart to kill the grass to the ground. Expect eradication of the grass after four or five applications at about weekly intervals.

Use 20 pounds of dalapon in 100 gallons of water for selective spraying of Johnsongrass sprouts in cotton when labor for hand spraying costs much more than 50 cents an hour and when early eradication of the grass is essential. Expect the first application to kill most of the grass to the ground and expect three or four applications at about 10-day intervals to eradicate it.