

Drainage for Wheat Production

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Adequate drainage is a requirement for achieving a crop's production potential. This is especially true for wheat since it is grown during the months that generally receive the highest rainfall. This rainfall can be beneficial to the crop if good drainage is provided. Unfortunately, many acres of wheat are grown on sites with inadequate or marginal drainage.

Adequate drainage includes both internal and external (surface) movement of excess water. However, conditions often exist that result in very little internal movement of water through the soil profile. Therefore, efforts to improve drainage generally involve activities to direct excess water across the surface of the field. These activities involve a range of efforts that vary in cost and effectiveness.

Surface Smoothing

Field surface smoothing and forming can improve the surface drainage of a field and should be done whenever possible. Land planes and floating equipment smooth out the high spots and fill in the low areas so the field has a more uniform surface. Small scrapers and blades should be used on the areas that require more soil movement than a plane or float provides. These efforts are not as effective as precision grading, but they are much less expensive.

Drain Furrows

Drain furrows are commonly used to improve a field's surface drainage.

The furrows are shallow and narrow and can be constructed with several different types of equipment.

Furrows need to be concentrated in the low areas of a field rather than being put in randomly. Drain furrows should generally run with or at a slight angle to the natural slope of the field but not perpendicularly across the direction of the slope. An effort should be made to accurately determine a field's drainage flow pattern. Some limited surveying of field elevations can be very helpful in determining where to place a furrow to drain a low spot. It is not always easy to decide where water will drain simply by looking at the field. The furrow should have continuous positive grade to assure that water will be directed off the field. **When surveying isn't possible, someone who knows the drainage flow pattern of the field should oversee drain furrow installation.**

Water should drain freely into a drain furrow. This seems rather straightforward, but it can be a problem. If a berm remains on the upgrade side of the furrow drain after it is constructed, water will back up before getting into the furrow. If the berm is unavoidable, then it should always remain on the downgrade side of the furrow. Furrow or ditching equipment that spreads the soil evenly on both sides of the furrow can help avoid this problem.

A drain furrow is not complete until it is connected to an outlet for the water. This usually means

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bringing the end of the furrow to a ditch that takes excess water away from a field. If the furrow ends at the edge of a ditch that has a bank elevation above the bottom of the drainage furrow, then the water will not freely drain out of the furrow. This condition must be corrected by either removing the restrictive bank or installing a drain pipe or some other outlet structure.

Precision Grading

Precision grading of a field is the most positive method of improving surface drainage. It is limited to fields with relatively flat (less than 1 percent) slopes, or the cost involved can be prohibitive. If a field is being considered for precision grading, the soil should be evaluated to determine what problems might occur if deep cuts have to be made in some areas. These cut areas can be less productive if the subsoil that is exposed has a reduced production capability. The finished slopes should be in the range of 0.1 to 0.5 percent (0.1 to 0.5 feet per 100 feet) if possible. This range provides good surface drainage without increasing erosion potential. An elevation survey of the field is required before any design work can be done. Precision grading is usually expensive, but it should be considered as a long-term investment for increasing the production potential and market value of the land.

Ditches

Another important component of field drainage is the ditch system that receives the excess water and carries it away from the field. Any flow restrictions in the ditches can cause excess water to remain on a field. Drainage ditches should be maintained and routinely cleaned out so that they will effectively handle the drainage water from a field. Ditch outlets

and drainage structures should also be routinely checked to assure that they are functioning properly and are not becoming restricted.

Field drainage improvements not only benefit the wheat crop but also provide benefit to subsequent crops. This is particularly true when the other crops are to be irrigated. Good field drainage complements all crop production practices, and every farm improvement plan should include both short- and long-term goals for improving drainage.

Points to Remember

- Use smoothing equipment to get field surface as smooth and uniform as possible.
- When installing drain furrows:
 - Install with or at a slight angle to field slope but not perpendicular to slope.
 - Assure continuous positive grade along the furrow.
 - Avoid berm remaining on up slope side of furrow.
 - End furrows at unrestricted outlet point.
 - Install outlet structures if needed.
 - Maintain existing outlet structures.
 - Maintain drainage ditches.
- Consider precision grading, if feasible.
- Plans for improving drainage should be included in every farm plan.