Straw or Hay Bales

Description

Alternatives to straw or hay bales should be used wherever possible

Straw or hay bales have historically been used on construction sites for erosion and sediment control as check dams, inlet protection, outlet protection, and perimeter control. Many applications of straw bales for erosion and sediment control are proving ineffective due to the nature of straw bales, inappropriate placement, inadequate installation, or a combination of all three factors (Fifeld, 1999). In addition, straw bales are maintenance-intensive and can be expensive to purchase. Because many applications of straw and hay bales have been ineffective, EPA recommends that other BMP options are carefully considered. This fact sheet provides more information and options for alternatives to straw and hay bales.

Limitations

Straw bales cannot be used to reduce erosion in a drainage channel because if a straw bale structure is installed across the channel, the cross-sectional area is reduced, resulting in increased velocity of stormwater flow (IECA, 2005). This would lead to increased erosion around the bales, widening the channel's cross-section.

Straw bales do not work well in areas with heavy rain or on sites with large drainage areas or steep slopes. Straw bales should never be used on streets or sidewalks as they cannot be properly staked into concrete or asphalt and will float away.

Straw bales are very impermeable and are not able to withstand high flows, and care must be taken during placement and installation to avoid failure from undercutting, overtopping, and end-running. USDA NRCS (no date) states that water depth should never exceed 1 foot at any one time and straw bale structures should never be installed across streams, ditches, or where flow is concentrated because they can exacerbate erosion and flooding.

Straw bale installations have a high failure rate. According to some erosion control experts, straw bale installations are seldom designed, installed, and maintained properly (Fifeld, 1999). In addition, straw bales are difficult to transport and to carry around on-site, especially when attempting to dispose of them when they are waterlogged. Oftentimes, the bindings break and the straw can wash into storm drains, causing clogging.

Straw bales will rot and fall apart over time, especially in areas of high rainfall, and therefore require intensive maintenance; they only last for approximately three months. Straw bales will float and therefore must be properly staked even in low flow conditions. As previously stated, in high flow conditions, the water will flow around a straw bale barrier or undercut spaces between the bales.

Another factor to consider is that straw bales may introduce undesirable non-native plants to the area if there are seeds in the bales.

Alternatives

On the following page is a list of typical applications for straw and hay bales and some alternative practices that have proven to be more effective.

Common uses of straw or hay bales	Alternative to straw or hay bales
Perimeter controls	Silt fence
Check dams	Rock check dams Fiber Rolls
Slope protection	Geotextiles Compost blankets
Storm drain inlet protection	Filter fabric, gravel bags, and other designs
Concrete washout structures	Prefabricated concrete washout containers

Considerations
If straw bales are used (only in limited circumstances), each bale should be a minimum of 14 inches wide, 18 inches high, 36 inches long and should have a minimum mass of 50 pounds. The straw bale should be composed entirely of vegetative matter except for the binding material. Bales should be bound by steel wire or nylon or polypropylene string. Jute and cotton binding should not be used. Baling wire should be a minimum 14-gauge diameter. Nylon or polypropylene string should be approximately 12-gauge in diameter with a breaking strength of 80 pounds of force. Wood stakes should be commercial quality lumber that is free from decay, splits, or cracks longer than the thickness of the stake, or other defects that would weaken the stakes and cause them to be structurally unsuitable. Steel bar reinforcement should be equal to a #4 designation or greater. End protection should be provided for any exposed bar reinforcement.

Maintenance Considerations
Straw bales degrade, and rotting bales will need to be replaced on a regular basis (as often as every 3 months depending on local conditions). Erosion from washouts around the bales will need to be repaired. Sediment that settles in ponded areas around correctly installed bales will need to be cleaned out when the sediment accumulation reaches one-third of the bale height. Straw bales will also have to be removed when they burst open or are no longer needed.

Effectiveness
Straw bale barriers have not been as effective as expected due to improper use, such as if they are placed incorrectly in drainageways where runoff volumes and velocities have caused the barriers to wash out. In addition, failure to stake and entrench the straw bale has allowed undercutting and end flow.

Often straw bale barriers will fill to capacity after small storms and can be washed away if not staked correctly. Straw bale structures cannot be designed for large storms and tend to fail during large runoff events.

Cost Considerations
Straw bales cost $5 to $7 each, or $9 to $15 per bale installed ($3 - $5 per linear foot). This does not include labor or material costs associated with maintenance.

References

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