

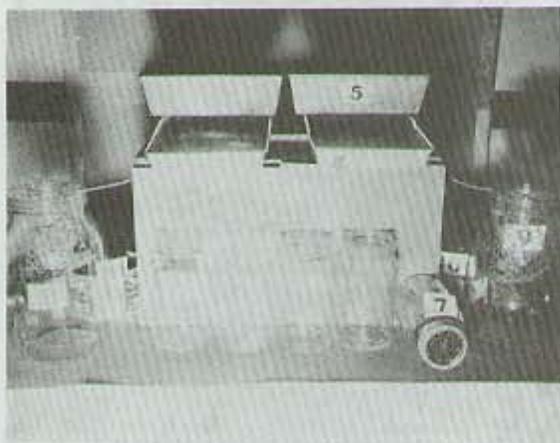
TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE

BERKELEY, CALIFORNIA

SOIL CONSERVATION SERVICE

ORGANIC MATTER AND MULCH DEMONSTRATION KIT



PURPOSE

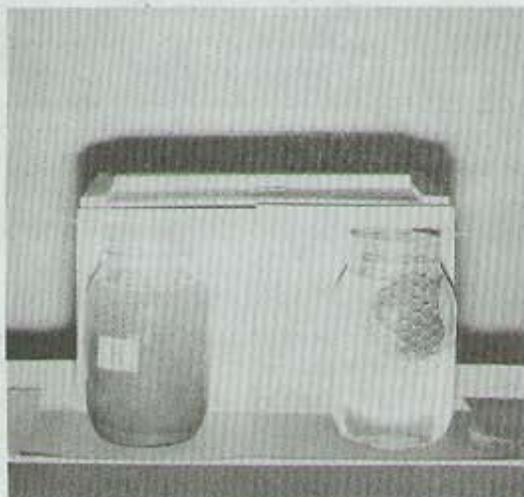
To show the Importance of Organic Matter and the Value of mulch in a Soil and Water Conservation Program.

Prepared and demonstrated by:
Charles B. Ahlson
Management Agronomist
Soil Conservation Service
Watsonville, California

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EQUIPMENT AND MATERIALS

1. Small canvas to protect table.
2. Apple box - carrying container.
3. Board, 1"x1" which fits between cleats on apple box - movable toward front or back to increase or decrease slope of pans.
4. Cake tins (4) 6"x9" with $\frac{1}{2}$ inch hole in bottom at end.
5. Bread pans (2) with about 5 small holes in bottom along edge. (Both should empty simultaneously)
6. Quart fruit jars (4) to catch run-off and erosion.
7. Quart jar (1) with perforated lid used to apply water and simulate rainfall.
8. Large-mouth gallon jars (2).
9. Netted wire baskets (2) used to suspend clods of soil in jars.
10. Samples of soil:
 - a. Soil and clods from cultivated field, preferably on local farm.
 - b. Soil and clods, high in organic matter from adjacent fence row.
11. Mulch material - straw, sawdust, or grass clippings. (Moro cojo soil is excellent to show contrast.)



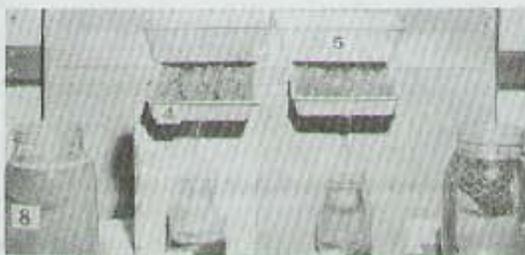
EFFECT OF ORGANIC MATTER IN SOIL

- a. Place clod from cultivated field in wire basket and submerge in gallon jar.
 - b. Place clod from fence row in wire basket and submerge.
- Results: Soil particles in low organic matter soil separate readily. Note muddy water. Soil particles in high organic soil held together, separate slowly. Water clear, little sediment. Move baskets with clods up and down to speed up break-down.



DEMONSTRATE RUN-OFF AND EROSION

1. Spread evenly one quart of soil from cultivated field in pan. Make 5 or 6 small furrows down slope to simulate implement marks.
2. Spread one quart of soil from fence row in other pan and make furrows.
3. Establish desired slope by moving 1"x1" board forward or back.
4. Set perforated bread pans on upper end of pans containing soil.
5. Pour one quart of water in each pan, preferably simultaneously.



Results: Note sheet and gully erosion on cultivated soil. The difference in soil and water loss provides a direct comparison of the importance of Organic Matter.



DEMONSTRATE VALUE OF MULCH

1. Spread and smooth one quart of soil from cultivated field in each pan.
2. Spread sawdust, grass clippings or straw $\frac{1}{4}$ to $\frac{1}{2}$ inch deep over soil in one pan.
3. Use quart jar with perforated lid, fill with water and shake over unprotected surface simulating rain.
4. Repeat on mulched surface.



results: Note reduced soil and water loss from soil with mulch. Mulch breaks the impact of raindrop which prevents sealing of surface soil. Also, see above picture for results of complete demonstration.

THE IMPORTANCE OF ORGANIC MATTER AND THE VALUE OF MULCH
IN A SOIL AND WATER CONSERVATION PROGRAM

Suggested Items for Discussion During Demonstration

POPULATIONS

Farmers and agricultural workers produce food and fiber for three populations. Name them - animal, human and, what is the third population? The third population, which actually should be considered the most important, is the group of micro-organisms in the soil. Without their activity the supply of food for the human and animal populations would be greatly impaired.

MICRO-ORGANISMS

Micro-organisms are the bacteria, molds, fungi and other small entities. In six inches of rich top soil these small organisms will weigh as much as 8 to 10 tons per acre and we cannot see them with the naked eye.

NUTRIENTS

Plant nutrients are released from the soil and organic matter by these small gluttons. Their food is organic matter. In eating or decomposing green growth, plant residues, manures, etc., and other types of organic matter, they release minerals. The minerals, both major and minor elements, are the essential plant nutrients. These minerals would not be available to plants, animals and humans if the micro-organisms were not properly fed. We must plan to feed this population.

HUMUS

The decomposing organic matter, consists largely of gums and resins called humus. This product helps to hold the soil particles together. Thus the soil becomes more stable. It will not wash away or erode as readily. It will absorb more water. It will produce more and better quality food and fiber.

THE PLANT AT WORK

The plant depends on the activity of micro-organisms. The plant is the most unique and important factory in the world. It takes raw materials, largely minerals, from the soil and from them manufactures sugar, starches, proteins, vitamins and amino acids. This process is called "photosynthesis", which takes place in the leaf in the presence of sunlight and carbon dioxide from the air. To date man has not been able to duplicate this process. He may in the atomic age.

MINERALS

Of the 109 elements now known, 60 have been found in plants, many of them considered essential for plant growth. These are the same minerals needed by animals and humans. These are the minerals released in part by the micro-organisms when sufficient organic matter in the proper proportions are supplied to them as food.

PRODUCTION

The chief means by which we can increase and maintain production is to grow and return more grasses, legumes and other forms of organic matter to the soil in either the green or dry state, and then add sufficient major or minor mineral elements if they are lacking in the soil.

THE FUTURE

Our future production of quantity and quality food and fiber depends largely on how we use organic matter. It is the life of the soil. We should use it where it does the most good and that is to return it to the soil - more and more of it.

STUBBLE MULCH

Stubble mulch falls in the category of crop residue utilization. It means using plant residues left in the field, such as stubble and straw to improve the soil, as contrasted with burning or removal of such material.

AGRICULTURAL CONTRIBUTION

Dr. Lowdermilk has made a statement as follows: "Leaving crop litter, which is sometimes called stubble mulch or crop residue, at the ground surface in farming operations is one of the most significant contributions to American Agriculture. Certain adaptations of the method need to be made to meet the problems of different farming regions, but the new principle is the contribution of importance".

VALUE OF STUBBLE MULCH

Stubble mulch provides protection against wind and water erosion by:

1. Breaking the impact of raindrops.
2. Reducing the velocity of runoff water.
3. Reducing wind velocity at the soil surface.
4. Improving percolation of water in the soil.
5. Adding organic matter to the soil more rapidly than when turned under or mixed with the soil.

THE PROBLEMS

The principle of stubble mulch is sound and effective. The problem is how to adjust farming operations to achieve the goal.

Many farmers can modify the present equipment or the method of operation. Others who need new equipment should select more efficient and effective implements designed to do the work with fewer operations at less cost.

MULCHING

Mulching means applying organic materials such as straw, hay, sawdust, wood chips, etc., to the surface of the ground to conserve moisture, prevent surface compaction or crusting, reduce runoff and erosion, to control weed growth (under heavy application) or to aid in establishment of desirable plant growth (under light application). It can also be applied to the mulching of cover crops and prunings in orchards and vineyards with a power mower.



POWER MOWER MULCHING

With the development and improvement of farm equipment, new conservation measures become more feasible. Power mulching in orchards is a relatively new practice, but the principles as outlined in this folder apply. Farmers are resourceful individuals and once the principles become clear, problems vanish in the development of a sound Soil and Water Conservation Program.