IX. General ways of minimizing water loss

a. Shallow dry tillage soon after harvesting can minimize the formation of deep cracks and occurrence of bypass flow. Tilled layer acts as mulch that reduces soil drying and cracking while small soil aggregates block big cracks.
b. Construct and maintain farm ditches and dikes that are necessary for efficient water conveyance and distribution among rice paddies.
c. Reduce percolation during land preparation and crop growth by plowing the field immediately after initial irrigation to seal big cracks.
d. Shorten land preparation to not more than 4 weeks but puddle the soil very well to increase water-holding capacity.
e. Practice synchronous farm operation (variation of around 2 weeks) within a considerable area and within 2 weeks starting land preparation.

X. Some condition-specific water-saving options

a. Application of 3-5 cm water every time water subsides. This technique minimizes Percolation rate due to hydrostatic pressure and prevent runoffs. Applicable to all types of soils intended for lowland rice production. Ideal for canal irrigation system.
b. Minimal irrigation to maintain soil saturation. This can be applied in areas with less weed pressure and having heavy to lighter soils. This technique also minimizes percolation rate and runoff. Can be used in canal irrigation and pump irrigation systems.
c. Application of 5-7 cm water during irrigation after 5-7 days of no water on the paddy. Applicable to heavy clay soils. Ideal for canal irrigation systems, pump irrigation systems and soils with micronutrient imbalances.
d. Application of 5-7 cm pond waters every 10-14 days interval. This can be applied in soils with shallow water table, high water holding capacity, do not develop deep cracks and more rigid hard pan. Irrigation frequency can be further reduced depending water availability. Suited for pump irrigation systems.
e. Reduction of pond water depth of around 20-40% less than the usual practice every irrigation time. Applicable to all t ypes of soils and ideal for pump irrigation systems and tail ends of gravity irrigation.

XI. Why water-saving techniques reduce water use during the growing period without reducing yield

a. Water saving techniques does not necessarily reduce yield despite significant reduction on irrigation water applied because only the excess water is removed. Thus, much water is being saved. It can be done by decreasing the frequency of irrigation and/or reducing the water volume per irrigation. This practice also provides some degree of aeration for better root and tiller development and to correct some soil nutrient imbalances.
b. Water-saving techniques can be done starting 15-30 days after transplanting or seeding. During this time, seedlings have recovered from transplanting stress and crop canopy is already closed to be more competitive against weeds.

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IRRIGATION WATER Management

DEPARTMENT OF AGRICULTURE
Regional Field Unit IX
Zamboanga City

IRRIGATION WATER
Management

Efficient water supply is one of the most important factors in successful and sustainable rice production. Since water is continuously becoming a scarce resource it has to be properly managed. Water greatly affects the rice plant, the soil nutrients, the physical status of the soil, the insect pests and diseases, the weed population.

I. The role of water to the soil-plant system and its importance

a. Plants absorb water from the soil through roots, transport it via conducting vessels, and release it to the atmosphere through their stomata. Along these processes, nutrient absorption, photo-synthesis, metabolism, and transport of materials concurrently occur.

b. When water absorbed is lesser than transpired, plants close their stomata and curl their leaves to lessen water lose. Thus, carbon dioxide (CO_2) intake and leaf area exposed to sunlight is greatly reduced leading to reduction of photo-synthetic rate.

II.Functions of water in rice production

a. Helps control weeds and aids in land preparation.
b. Cools the soil to be favorable for plant growth.
c. Dissolves and carries mineral nutrients from the soil to the plants and distributes photosynthetic product to the different parts of the plant.
d. Serves as medium for physico-chemical processes in the soil to support plant growth and development.
e. Cools the plant, helps regulates stomatal openings and make the plant erect and leaves fully expanded for better sunlight exposure and carbon dioxide intake.

III. Total water requirements of the rice crop

a. The total irrigation water requirement for the whole cropping season varies depending on soil type, topography, proximity to drainage, depth of water table, sub soil profile characteristics, crop duration, area of contiguous fields and cultural management practices.

b. Medium to heavy textured soils requires around 700 – 1,500 mm of water per cropping season under traditional practices at 100 days growing period.

IV. Sources of water for rice production

a. Surface waters (rivers, lakes, surface drainage, creeks, and ponds).
b. Ground water (can be obtained through pump to lift the water from subsurface to the ground level and to the farms.
c. Precipitation (rain and drizzle).

V. Common water management practices

a. Continuous flooding with stagnant water – Irrigation to maximum pond of water depth before floodwater subsides.
b. Continuous flooding with flowing water – Non stop application of water.
c. Rained water management – Impounding rain water in the paddy. Thus, water use efficiency is greatly influenced by skill of the farmer, the sequence of paddies, the amount of rainfall, mutual consent among neighboring farmers, the rate of see page and percolation and the slope ofthe land.

VI. How water is lost from the rice field.

a. *Evaporation* is the moisture lost in vapor form from the free water surface. This is affected by solar radiation, temperature, wind , relative humidity and plot cover.
b. *Percolation* is the downward movement of water through soil due to gravity, hydrostatic pressure or both.The finer the soil, the lower the percolation rate. The presence of deep cracks can increase percolation. Puddlings, presence of hard pan, soil compact layer or nonporous subsoil greatly reduce percolation. Ideal percolation rate is around 5mm per day for lowland rice.
c. *Seepage* is the horizontal movement of water through a levee and normally flows into the soil surface or into streams, rivers, or drainage. Sometimes, seepage water can be used in other farms.
d. *Runoff* or surface drainage loss is the movement of water over a levee. It occurs when water is not controlled or it is impossible to control like in the case of strong rains or floods.

VII. When and how irrigation water is being applied in transplanted rice field

a. In the seedbed, when all seedlings had immerged, maintain around 2 – 3 cm pond water depth to prevent soil from becoming hard during seedling pulling.
b. Within one week after transplanting, maintain soil saturation to control snail infestation and establish better soil – root contact.
c. During the tillering up to booting stage, occasional soil aeration stimulates deeper root growth, tiller production, firm root anchorage, correction of micronutrient imbalances, and removal of toxic substances from the soil.
d. During ripening period, stop irrigation and if there is still any standing water one week before the expected harvest time, drain it for more uniform grain maturity. This also facilitates harvest and post harvest operations.
e. During the rest of growing period, apply around 5-7 cm water depth.

VIII. The use of water in weed management.

a. Weeds can be effectively controlled with the aid of water, not by how much the volume used but by when and how it was used.
b. A uniform thin water blanket can control more weeds than deep and non uniform pond water depths in the paddy.
c. Some herbicides require the presence of flood water during application while some do not require to be most effective.
d. Weeds must be controlled as early as possible for maximum benefits and before water saving activities starts.
e. Water-saving options can be applied starting 3-4 weeks after crop establishment.