Conservation-Agriculture for Smallholder Sustainable Crop Production

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Conservation-Agriculture (CA) is the best known technological approach for producing sustainable food production on smallholder village farms. CA is not a one-practice-fits-all formula for crop production, but rather a framework for combining compatible cropping-management practices to accomplish short-term and long-term goals which are beneficial for the health and welfare of smallholder communities.

Successful CA cropping Captures Rainfall **Water**, Stores Captured **Water** in the soil, and Efficiently Utilizes Stored **Water** for successful crop production.

Global CA adoption/adaptation efforts are mainly targeting rainfed/dryland agricultural cropping because ~80% of global agricultural lands are rainfed and not irrigated. Food scarcity is most common in these dryland regions because crop yields are highly variable and generally less than on irrigated lands.

Successful CA cropping schemes fall into two categories, namely "one-pass direct seeding"/"no-till" or "two-pass strip-till (for row crops only)". One-pass "no-till" is conducted directly into undisturbed, firm, residue covered soils. It can be used for both drilled and row crops. Two-pass "strip-till", wherein the soil in the crop row is loosened prior to seeding, can only be used with row crops, but this can be advantageous when used in problem-soils to obtain improved crop stands and yields.

CA field operations are conducted with manual, animal-draft, and/or small tractor tools and technologies. Regardless of the power source, the same basic field operations are necessary: kill all vegetation in the field prior to seeding, [if using strip-till, loosen the row paths with an implement], clear the soil-covering residues in the row paths and place seed in the soil, apply fertilizer materials, control weeds, and harvest the crop, keeping all old-crop stalks and stubble residues on the field to aide water conservation for the following crop.

CA cropping highly depends upon management, effective weed control, successful seeding into undisturbed and residue-covered soils, and fertilization techniques.

For small tractor mechanization, we recommend the use of 2-wheel tractors (2WTs) of 8-16 Hp.

For weed control applications, we recommend the use of broadcast sprayers with the application nozzles positioned behind the operator to minimize exposure to agricultural chemicals.

For both no-till and strip-till seeding, we recommend the use of either one-row or drill-type seeders that have been developed to be operated in CA field conditions, and powered by either draft-animals or 2WTs.

For fertilization, we recommend the application of low non-toxic rates of "starter fertilizers" in the seed furrow, followed by metered "side-dress" applications of fertilizer materials in bands beside the emerged/established crop rows.

WEB Information for CA-Mechanization implements: www.MorrisonSeeders.com

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