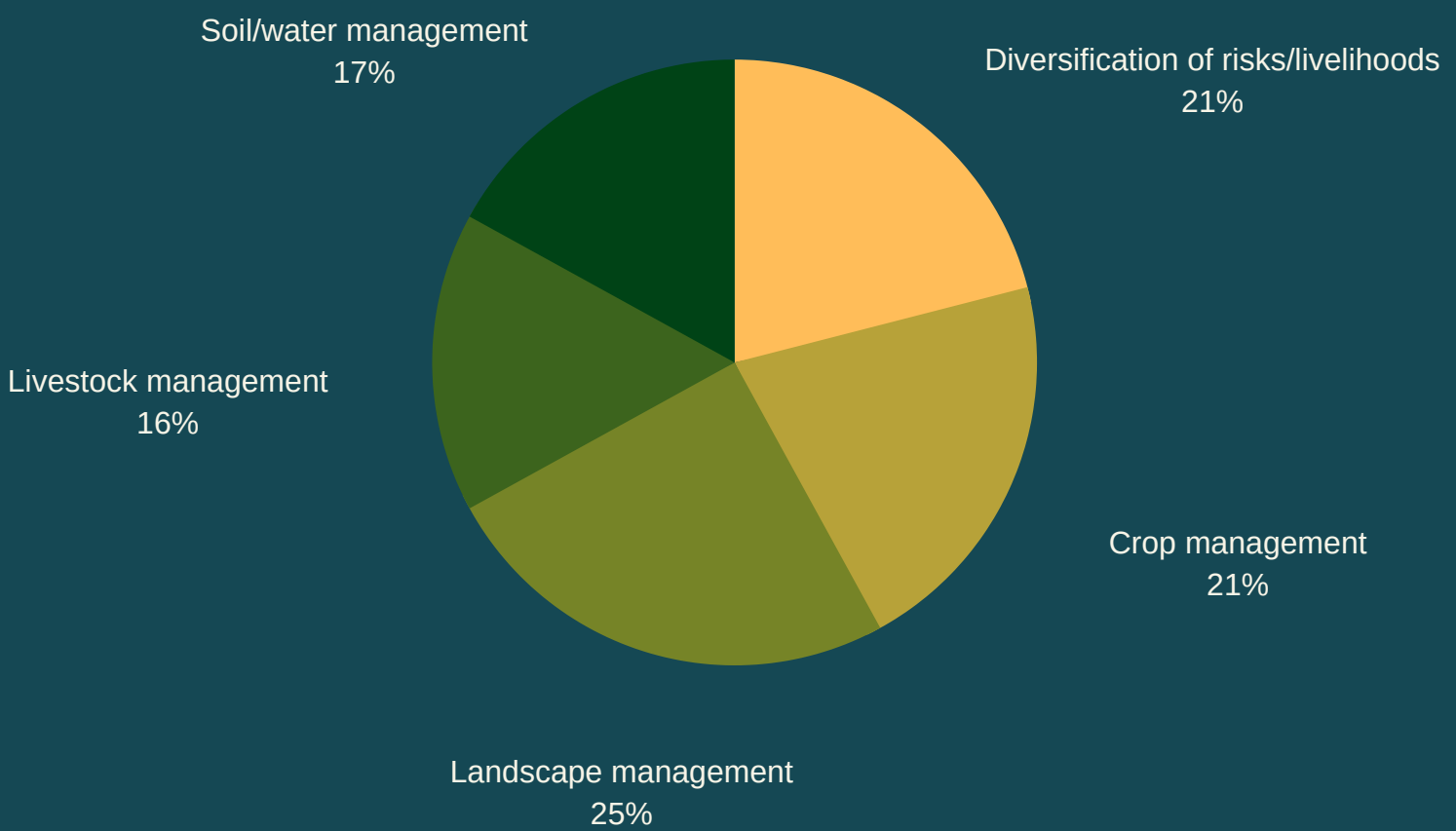
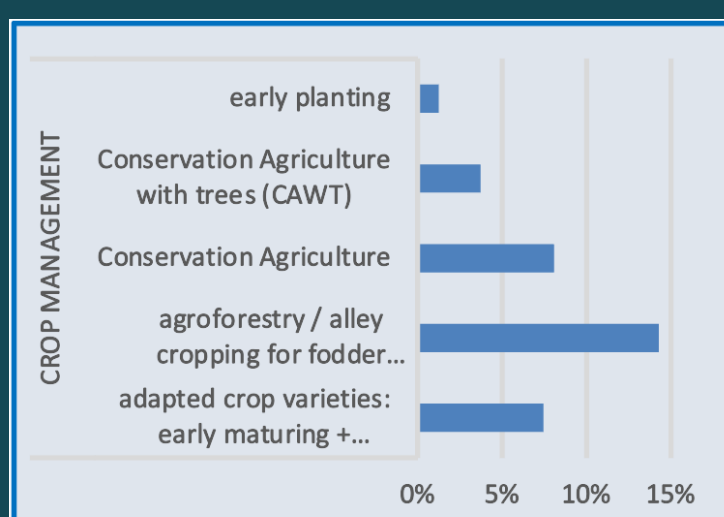
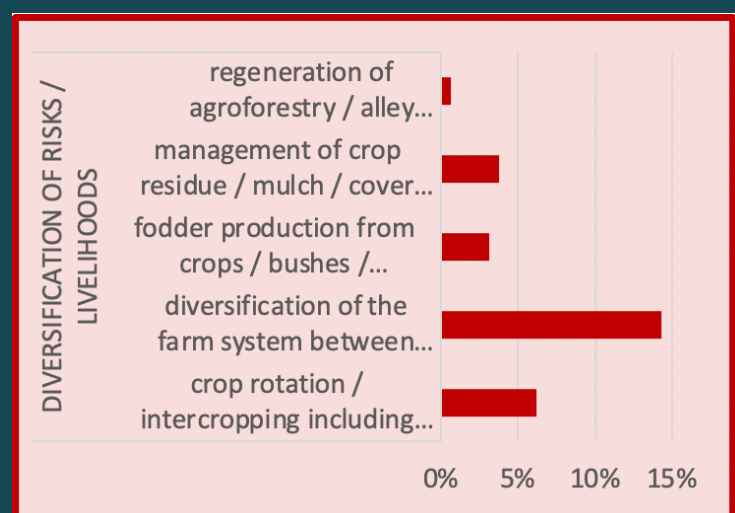
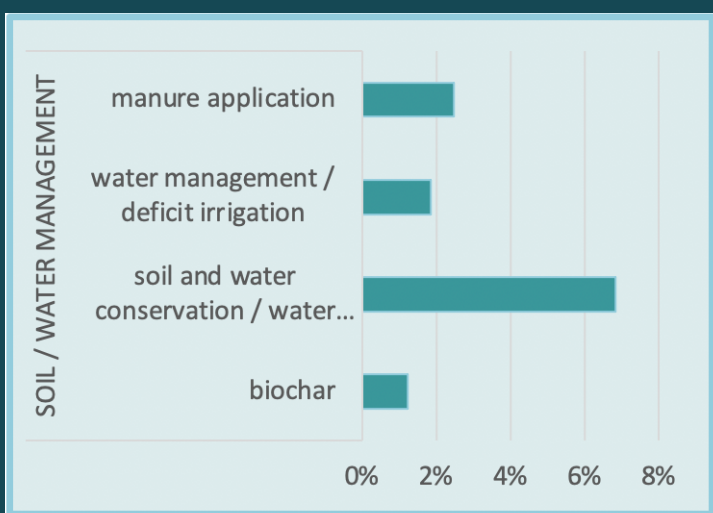
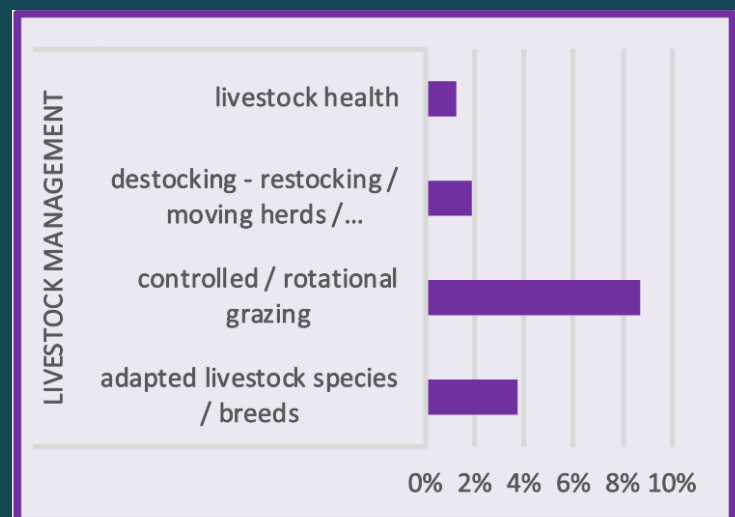
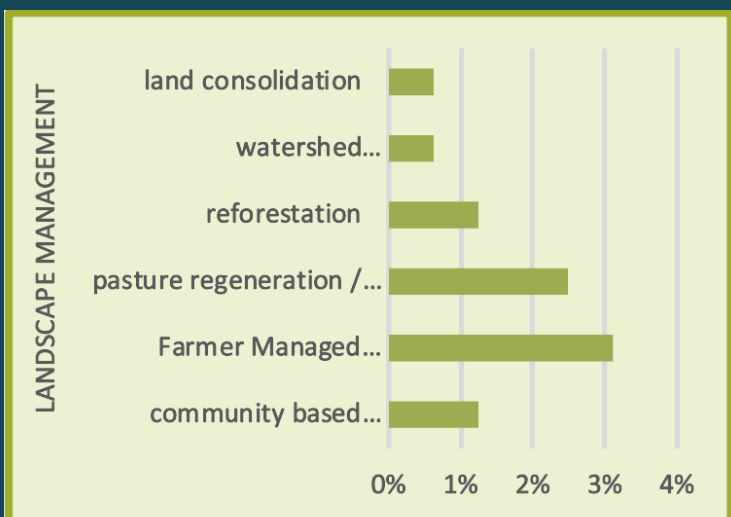


# SURVEY RESULTS FOR DRY SUBHUMID DRYLANDS

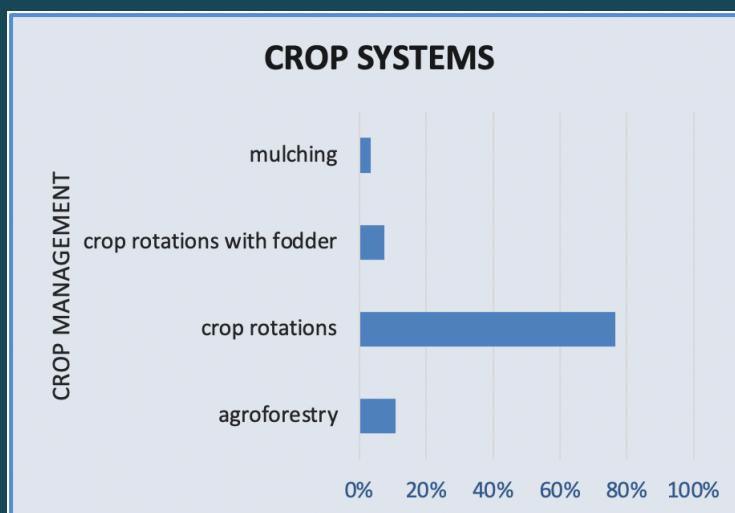
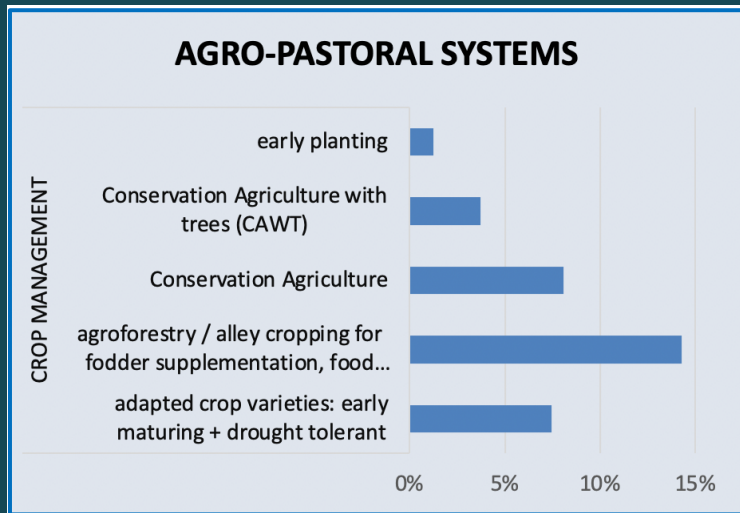
ADAPTING AGRO-PASTORAL SYSTEMS TO CLIMATE CHANGE REQUIRES SOLUTIONS FOR LANDSCAPE MANAGEMENT, LIVESTOCK AND CROP PRODUCTION



## MANAGEMENT PRACTICES RECOMMENDED BY RESPONDENTS:



# CROP MANAGEMENT PRACTICES THAT MAKE BEST USE OF RESIDUAL SOIL MOISTURE IN ALL FARM SYSTEMS



## CROP MANAGEMENT PRACTICES THAT MAKE BEST USE OF RESIDUAL SOIL MOISTURE

### CROP ROTATIONS

- **Alternate shallow - and deep-rooted crops to make best use of soil moisture**  
e.g.: millet / soybean - cotton / sunflower / yam / cassava
- **Alternate annual legume and cereal crops to produce biomass of the right C/N composition throughout the crop rotation having care of starting from a N enriching crop, following with a more N demanding crop and ending the crop rotation with a less N-demanding crop**  
e.g.: groundnuts / soybean / chickpea / green gram / mucuna - millet / sorghum - maize
- **Alternate annual legume / short maturing variety, cereal and root crops or oil crops in order to produce food, sell cash crops and maintain fertility**  
e.g.: cowpea / soybean / groundnut / buckwheat - maize / wheat - cassava / rapeseed
- **Intercrop cereals (grown during the rain season) and legumes (grown in the dry season) of species and varieties selected based on residual moisture available**  
e.g.: maize / short duration cereals (sorghum / millet) + lablab / cowpea / lentil / chickpea / lima bean (for food and fodder)
- **Include biennial crops as alley crops or relay crops whenever possible**  
e.g.: pigeon pea relay sown in groundnut (doubled-up legume intercropping system)
- **Grow an early maturing / short cycle crop after an irrigated crop to make use of residual soil moisture**  
e.g.: rice - lentils / chickpeas / cover crops - sorghum / millet

### CROP ROTATIONS FOR FODDER PRODUCTION

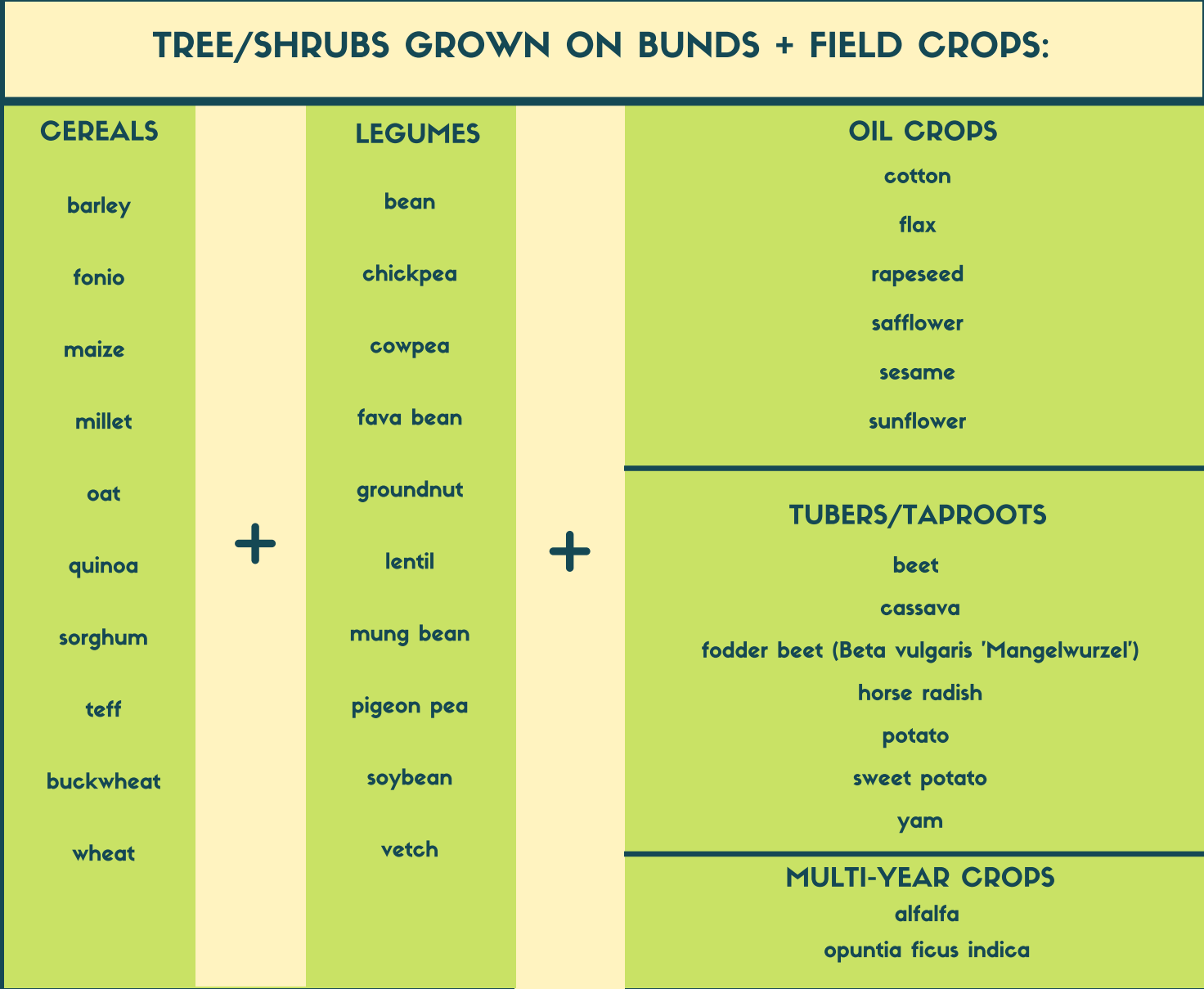
- **Include high biomass producing food crops in the rotation in order to produce food and use the crop residue as fodder**  
e.g.: barley - field pea
- **Include fodder crops as intercrops**  
e.g.: triticale + pea / ryegrass / ryegrass + clover / cereals + Italian sainfoin / cereals + faba bean
- **Include fodder crops as strip crops to diversify the farm system and achieve fast soil cover for erosion control:**  
e.g.: fodder grass (e.g. Cenchrus ciliaris / Brachiaria) + legume food crop (e.g. mung bean / cowpea / beans / groundnut / lablab) / legume fodder crop (e.g. common vetch) + cereal (e.g. millet)
- **Include multi-year fodder crops**  
e.g.: wheat / teff / sorghum - clover / alfalfa

## DIVERSIFIED CROP SYSTEMS WITH MULTIPURPOSE AGROFORESTRY SPECIES ARE SUCCESSFUL ADAPTATION MEASURES

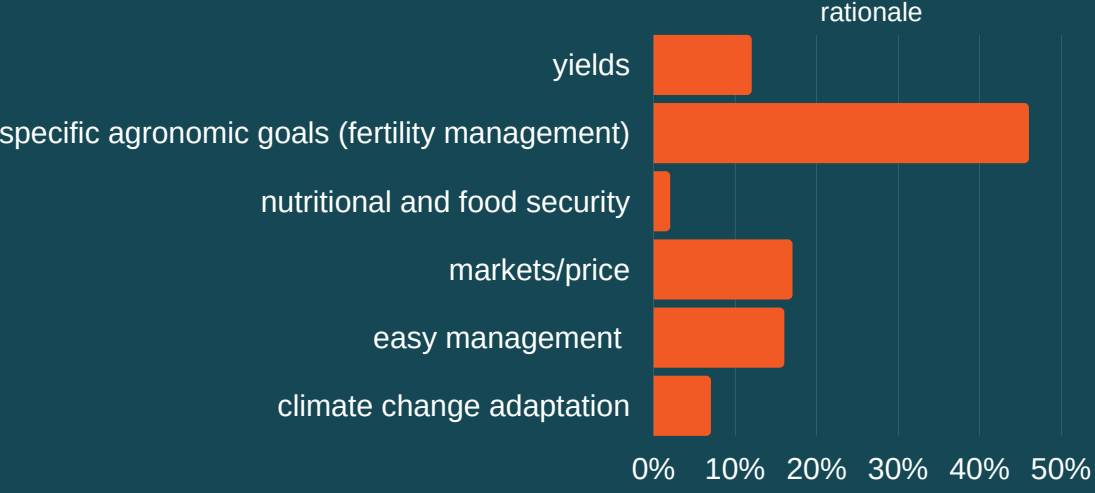
### AGROFORESTRY SYSTEMS

- **Multipurpose agroforestry systems help supplement feed production in areas where water is limited agroforestry leguminous species**  
e.g.: Acacia raddiana / A. Senegal / A. nilotica / pigeonpea / Tipuana tipu / Chamaecytisus proliferus ssp.palmensis / Prosopis cineraria / Sesbania spp.) + cereals/ vegetables(e.g. rice / onion) + mulch and carry (e.g.Dodonaea viscosa)
- **Agroforestry species to produce biomass**  
e.g.: Azadirachta indica / Opuntia ficus-indica) + legumes to supplement forage
- **Multi-storey food crops**  
e.g. plantain + yam

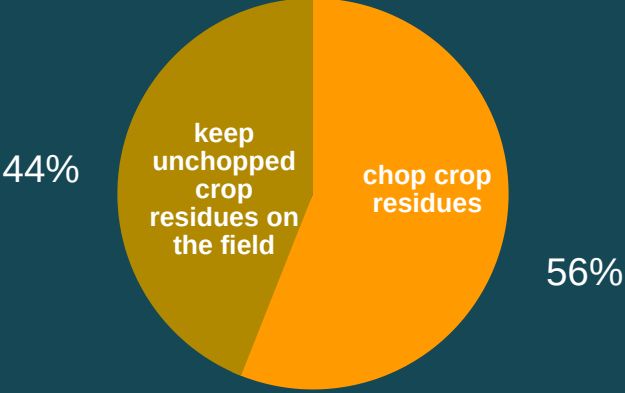
**A DIVERSIFIED CROP ROTATION ENSURES FOOD, BIOMASS AND SOIL FERTILITY. HERE IS HOW RESPONDENTS SUGGEST TO BUILD IT:**



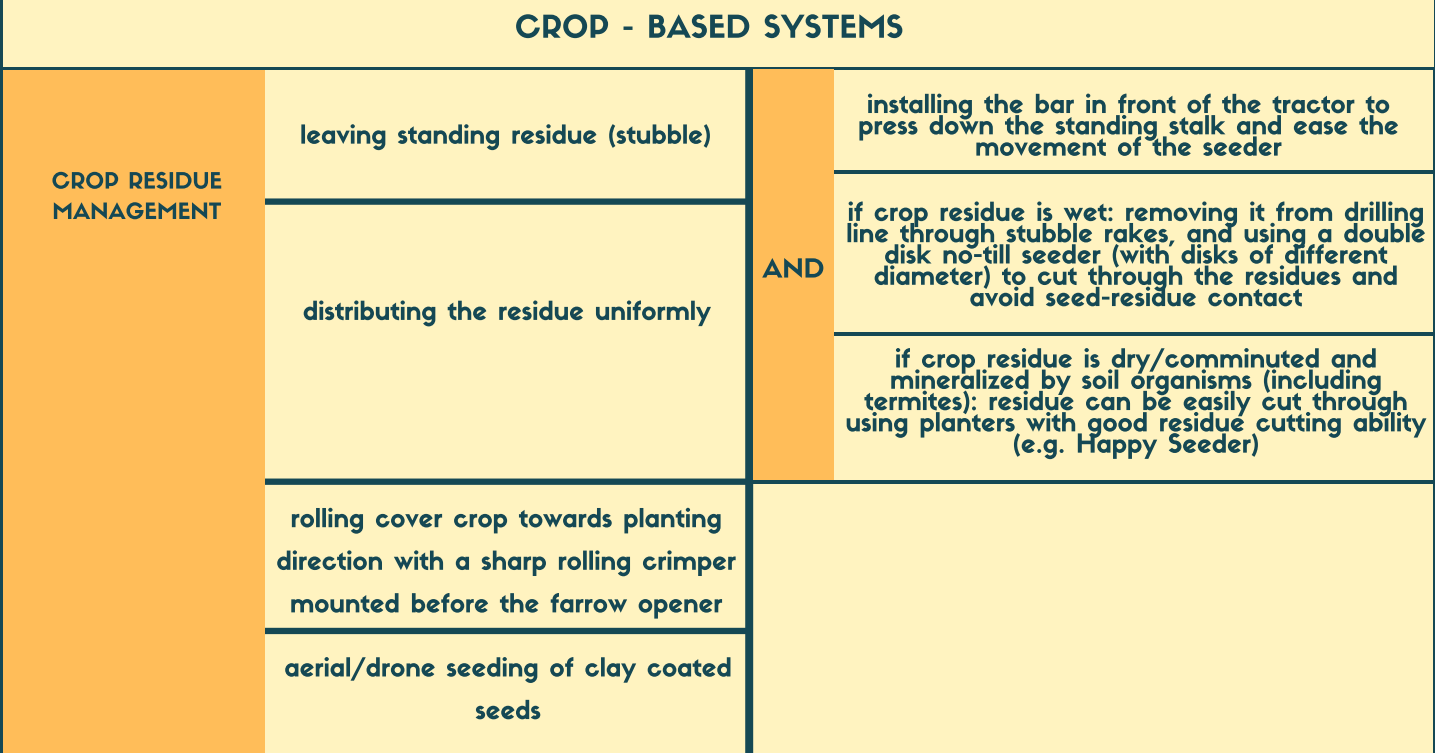
**AGRONOMIC GOALS ARE THE MAIN DRIVERS THAT INFLUENCE CROP SYSTEMS**



**MOST RESPONDENTS KEEP CROP RESIDUE UNCHOPPED IN THE FIELD**



**IN CROP-BASED SYSTEMS, USING MECHANIZED NO-TILL REQUIRES ADJUSTMENTS TO THE EQUIPMENT TO IMPROVE PENETRATION THROUGH CROP RESIDUE.**



**IN CROP-LIVESTOCK SYSTEMS, ADJUSTMENTS TO THE MECHANIZED NO-TILL EQUIPMENT IS NOT NEEDED BECAUSE LIVESTOCK TRAMPLING AND GRAZING REDUCE CROP RESIDUE WHILE RETURNING MANURE AND URINE.**

# RECOMMENDED PRACTICES FOR WEED MANAGEMENT

## mechanical management

weeds removed (pulled out manually or slashed/chopped/shredded to maintain the root biomass in the soil before flowering and used as mulch.

19%

22%

## integrated management with chemical control

grazing - agronomic management, chemical control

2%

## integrated management without chemical control

grazing - agronomic management

20%

## chemical control

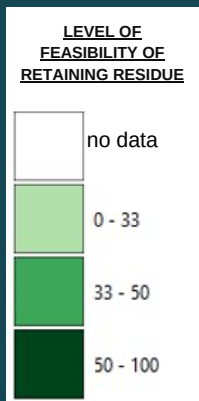
37%

## agronomic management

In addition to high quality seeds, cover crops/mulch and crop rotations this includes narrow spacing of main crops, intercroops (e.g. beans in maize) and cover crops (e.g. sorghum)

# RESULTS ON THE FEASIBILITY AND EFFECTIVENESS OF CROP RESIDUE THAT NEEDS TO BE PRODUCED TO ACCOMMODATE BOTH FEED REMOVAL AND SOIL HEALTH NEEDS

MAP SHOWS WHERE RESPONDENTS INDICATE THAT RETAINING 5 T/HA/YEAR OF CROP RESIDUE (EQUIVALENT TO 2.5 T OF CARBON/HA/YEAR IN THE CASE OF MAIZE STOVER) IS ATTAINABLE IN DRY SUB-HUMID AREAS



MAP SHOWS WHERE RESPONDENTS INDICATE THAT APPLYING 5 T/HA/YEAR OF CROP RESIDUE IS SUFFICIENT TO MAINTAIN SOIL ORGANIC CARBON (SOC) STOCKS IN DRY SUB-HUMID AREAS

