

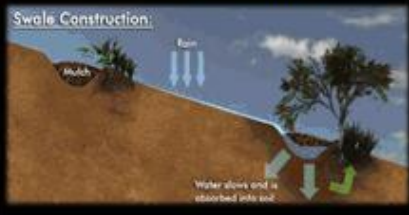
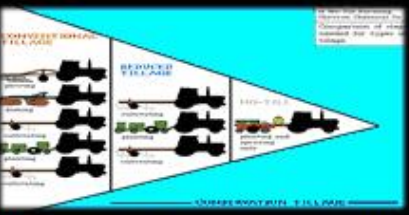
ADAPTATION MEASURES LIST

The following table reports the list of Adaptation Measures suggested by DESERT-ADAPT and experienced in this and previous projects.

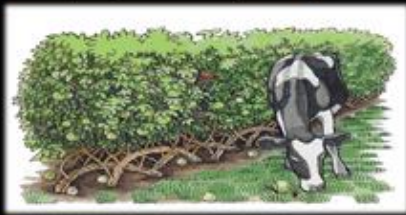
In the following page a visual with a brief explanation is given for each measure. For the underlined measures a dedicated more specific form is available in the REPLICATION TOOLKIT FOLDER "ADAPTATION MEASURES"

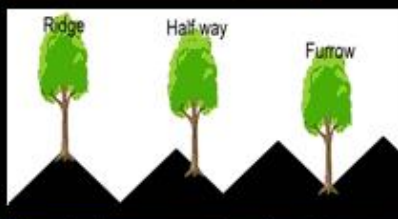
All Adaptation Measures		
1	<u>Seed collecting</u>	19 Nurse shrubs
2	Cut seedlings (twigs)	20 Planting density
3	<u>Existing vegetation</u>	21 <u>Plant hole digging</u>
4	<u>Mycorrhizae & plants</u>	22 Interplanting
5	<u>Mycorrhizae & soils</u>	23 <u>Planting in mixes</u>
6	Animal traction	24 Regular planting
7	Swales	25 <u>Natural/living fences</u>
8	Keylines	26 <u>Plant support & water batteries</u>
9	<u>Half-moons</u>	27 <u>Watering/Drip irrigation</u>
10	<u>Soil ripping</u>	28 <u>Plant protectors</u>
11	<u>Conservation Tillage</u>	29 <u>Plant assist & mulching</u>
12	<u>Ridge and furrows annual crops</u>	30 <u>Fencing installation</u>
13	<u>Capture & Store Water</u>	31 <u>Grafting trees</u>
14	<u>Organic fertilizer</u>	32 Diseased trees
15	<u>Pasture improvement</u>	33 Weed control
16	Seeding (annuals)	34 IPM Plague control
17	<u>Legumes</u>	35 <u>Use of Pruning material</u>
18	Cover crops	36 Livestock breeds
		37 <u>Livestock Grazing</u>
		38 Ecoservices
		39 Biodiversity
		40 Social
		41 Landscape
		42 Biofuels
		43 <u>Planting on ridges & furrows</u>
		44 <u>Firewood 10% rule</u>
		45 Natural Regeneration
		46 <u>Flood walls</u>
		47 <u>Aquatic filters</u>
		48 <u>Shadow trees</u>
		49 Pruning fruit trees
		50 Machine wide rows
		51 <u>Planting material</u>
		52 <u>Root protection</u>
		53 Live barriers & Filter berm
		54 <u>Fire security plan & green firebreak</u>

Adaptation Measures in Brief

SEED COLLECTING <i>Collect from best sources</i>	1	CUT SEEDLINGS (TWIGS) <i>Use your own resources</i>	2	EXISTING VEGETATION <i>Cut or Remove: less carbon loss</i>	3
					
Genetic selection: collect seeds from selected trees or plants that behave well under climate changes.		Create you own nursery, develop roots on twigs, taken from best genetic sources (that do well under climate change).		Preferable only cut (use shredder) vegetation instead of removing it completely. Otherwise its a carbon loss.	
Costs to implement: ➡		Costs to implement: ➡		Costs to implement: ➡	
MYCORRHIZAE & PLANTS <i>Inoculate planting material</i>	4	MYCORRHIZAE & SOILS <i>Add mycorrhizae to soil</i>	5	ANIMAL TRACTION <i>Protect soils</i>	6
					
Makes plant more resilient to droughts, diseases and increases root surface. Use them also to produce mushrooms.		Improves crop resistance and nutrient availability.		Use animals when there are dangers for soil compaction or erosion and save on fuel.	
Costs to implement: ➡		Costs to implement: ➡		Costs to implement: ➡	
SWALES <i>Establish swales on your land</i>	7	KEYLINES <i>Establish keylines on your land</i>	8	HALF-MOONS <i>Establish half-moons on lands</i>	9
 Swale Construction:					
Improves water infiltration, avoids soil erosion.		Improves water infiltration, avoids soil erosion.		Improves water infiltration, avoids soil erosion.	
Costs to implement: ➡		Costs to implement: ➡		Costs to implement: ➡	
SOIL RIPPING <i>If soils are compacted</i>	10	CONSERVATION TILLAGE <i>Reduce soil compaction etc</i>	11	RIDGE AND FURROWS <i>Use Roman plough in farming</i>	12
					
Creates planting space, reduces compaction and improves water infiltration.		Using specialized ploughs and equipment to reduce soil compaction, evaporation and soil loss.		Improves water infiltration, avoids soil erosion and loss of SOC.	
Costs to implement: ➡		Costs to implement: ➡		Costs to implement: ➡	

CAPTURE & STORE WATER <i>Ponds, small lakes etc</i>	13	ORGANIC FERTILIZER <i>Results in less climate impact</i>	14	PASTURE IMPROVEMENT <i>Additional legumes</i>	15
					
For water availability throughout the year and to increase wildlife.		Adds Nitrogen and improves soil texture and availability of moisture and nutrients.		Improving pasture resilience and fodder quality with introducing (seeding) additional species (legumes).	
Costs to implement: 		Costs to implement: 		Costs to implement: 	
SEEDING (ANNUALS) <i>Between rows of trees etc</i>	16	LEGUMES <i>Cultivate to improve soils</i>	17	COVER CROPS <i>Cover bare soils</i>	18
					
Soil cover is important because covers are expected to decrease temperature and radiation damage to soils.		Adds Nitrogen and improves soil texture and availability of moisture and nutrients.		Cover bare soil to retain moisture, organic matter and to prevent weeds and soil erosion.	
Costs to implement: 		Costs to implement: 		Costs to implement: 	
NURSE SHRUBS <i>Natural tree protector</i>	19	PLANTING DENSITY <i>Set planting density/specie</i>	20	PLANT HOLE DIGGING <i>Selective digging of holes</i>	21
					
Protects tree seedlings from predation and weather exposure by planting them inside shrubs.		Take into account shadow, moisture, available nutrients and water and climate projections.		Avoids large-scale soil disturbance. Select: by hand, machines, cross-ripping etc.	
Costs to implement: 		Costs to implement: 		Costs to implement: 	
INTERPLANTING <i>In existing vegetation</i>	22	PLANTING IN MIXES <i>Reduce risks, improve productivity</i>	23	REGULAR PLANTING <i>In rows, patched or blocks</i>	24
					
Improves biodiversity, ecosystem resilience, protects seedlings, prevents soil erosion.		Combine species that are mutually beneficial. Mosaic management and landscape diversification are key words.		Think what fits best the local circumstances. Take into account regular requirements (wind, risks, slopes etc).	
Costs to implement: 		Costs to implement: 		Costs to implement: 	

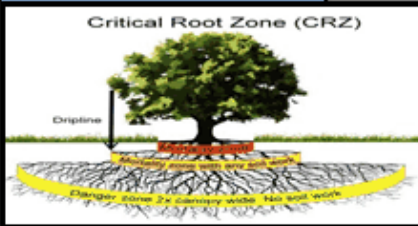
NATURAL FENCE STYLE <i>Multi-purpose natural fence</i>	25	PLANT SUPPORT <i>Plant Cocoons, coca mats, etc</i>	26	WATERING/D RIP IRRIGATION <i>Apply drip irrigation/watering</i>	27
					
Protects your crop and provides food, fodder and shelter for biodiversity. Shape it as a true fence when required!		Improves survival rates of seedlings under harsh environmental conditions.		Saves water. In principle watering seedlings 4-5 times per year with a tractor & water tank is also an option.	
Costs to implement: ➡		Costs to implement: ➡		Costs to implement: ➡	
PLANT PROTECTORS <i>Cactus model, or others</i>	28	PLANT ASSIST <i>Wood chips or rocks</i>	29	FENCING INSTALLATION <i>Livestock & Wildlife fencing</i>	30
					
Plastic sheets, wooden or metallic wire, cactus models. Protects plants from predation.		Use wood chips, rocks or other available cover material to protect against weed & to improve soil moisture and fertility.		Protect seedlings against cattle or wildlife and improve natural regeneration.	
Costs to implement: ➡		Costs to implement: ➡		Costs to implement: ➡	
GRAFTING TREES <i>Use resistant rootstock</i>	31	DISEASED TREES <i>Remove when required</i>	32	WEED CONTROL <i>Avoid chemicals</i>	33
					
Improves overall resilience and productivity by using resistant rootstock with productive fruit.		Avoid cross-contamination.		Use Propelled Abrasive Grit Management (PAGMan). It uses grit (a waste product) to blast away small weeds in the rows.	
Costs to implement: ➡		Costs to implement: ➡		Costs to implement: ➡	
IPM PLAGUE CONTROL <i>Integrated Pest Management</i>	34	PRUNINGS <i>Use prunings in optimum way</i>	35	LIVESTOCK BREEDS <i>Select local breeds</i>	36
					
Develop IPM, carry out insect & plague control on eco-friendly way. Provide shelter/host plants for predator insects.		Stack the prunings in rows to improve soils, collect water and biodiversity. Hugelkultur. Chipping is also possible.		Improves feed-to-weight ratio and saves on expenses.	
Costs to implement: ➡		Costs to implement: ➡		Costs to implement: ➡	

LIVESTOCK GRAZING <i>Rotational Grazing program</i>	37	ECOSERVICES <i>Finalize remaining actions</i>	38	BIODIVERSITY <i>Finalize remaining actions</i>	39
					
<i>Grazing plan: Moving herds between fields to promote pasture regrowth and combine multiple types of livestock.</i>		<i>Discuss actions one by one.</i>		<i>Discuss actions one by one.</i>	
<i>Costs to implement:</i> ➡		<i>Costs to implement:</i> ➡		<i>Costs to implement:</i> ➡	
SOCIAL <i>Finalize remaining actions</i>	40	LANDSCAPE <i>Restore natural landscape</i>	41	BIOFUELS <i>Work climate neutral</i>	42
					
<i>Discuss actions one by one.</i>		<i>Restore waterways, slopes, biodiversity hotspots, traditional infrastructure etc.</i>		<i>Using biofuels as much as possible to erase your carbon footprint</i>	
<i>Costs to implement:</i> ➡		<i>Costs to implement:</i> ➡		<i>Costs to implement:</i> ➡	
PLANTING ON RIDGES? <i>Plant in smart ways</i>	43	FIREWOOD 10% RULE <i>Leave deadwood</i>	44	NATURAL REGENERATION <i>Protect NG !</i>	45
					
<i>When lands are sometimes flooded, plant on ridges. When always dry, plant in furrows. Or in between!</i>		<i>Leave around 10% of all deadwood, laying down or standing, for biodiversity purposes.</i>		<i>Protect Natural Regeneration by small plant protectors or fences.</i>	
<i>Costs to implement:</i> ➡		<i>Costs to implement:</i> ➡		<i>Costs to implement:</i> ➡	
FLOOD WALLS <i>Build small stone walls</i>	46	AQUATIC FILTERS <i>Keep your lake clean</i>	47	SHADOW TREES <i>Create shield for sunburn</i>	48
					
<i>Build small stones walls in valleys to slow down water flows during heavy rains. Erosion control.</i>		<i>Every lake or pond needs aquatic plants to stay clean. Plant special aquatic filtering plants.</i>		<i>Some fruit species like apples and pears can be damaged by too much sun. Plant shadow trees in between the fruits!</i>	
<i>Costs to implement:</i> ➡		<i>Costs to implement:</i> ➡		<i>Costs to implement:</i> ➡	



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REPLICATION TOOLKIT

PRUNING FRUIT TREES <i>Low or high fruits?</i>	49	MACHINE WIDE ROWS <i>Space between rows</i>	50	PLANTING MATERIAL <i>Instruct your nursery!</i>	51
					
Decide if you like to create high trees (extensive) or low trees (intensive) with fruit production.		When rows are planted and annuals has to go in between make sure these have the width of a common harvesting		Aim for maximum root systems. Roots are more important than plant! Ask FSG for special guidance document.	
Costs to plant & plant material		Costs to plant & plant material		Costs to plant & plant material	
ROOT PROTECTION <i>No machines around trees.</i>	52	LIVE BARRIERS & FILTER BERM <i>Avoid soil runoff</i>	53		
					
No machine or soil work around each tree. Take at least a 2x canopy wide circle around each tree that is fully		Plant live barriers with sturdy plants to avoid soil runoff, cover the soils and improve biodiversity. Plant them on compost berms.			
Costs to plant & plant material		Costs to plant & plant material			