

Annex 13

Factors affecting yield

Factor	Effect	Possible Impact
Rainfall		
Drought	Poor plant growth - no development	Crop failure - no yield
Dry-spells at germination	Poor germination, reseeded	Optimum planting time missed, plants vulnerable, lower yield
Dry-spells at early vegetative growth	Reduced tillering, fewer heads	Fewer heads per m ² yield reduced. ²⁰
Dry-spells at flowering/pollinating	Reduced fertilisation; poor seed set	Fewer seeds, reduced yield per plant
Dry-spells at grain-fill	Smaller seeds	Lower yield per plant
Heavy rains	Water-logging - disturbed nutrient uptake. Rotting of roots and stems	Lowered metabolism-reduced growth. Plant death
Extreme events		
Floods	Parts of fields submerged	Plants lost, yield per ha reduced. ²¹
Hailstorms	Early damage to leaves Damage to head	Recovery likely; probably little effect (exaggerated because looks bad) Seed loss, yield reduced
Unseasonably high temperatures	Increased plant water-demand, desiccation	Increased dry-spell effects Very high dry-matter grains-apparent yield reduction
Unseasonably high winds	Increased plant water-demand, desiccation	Increased dry-spell effects
Credit supply		
Delay in release of credit or credit terms	Interference with timeliness of all operations	Slight yield reduction of input using farmers
Reduction in credit	Reduced availability of all inputs	Serious reduction in yields of input using farmers

Fuel shortages		
Reduced fuel availability	Reduced availability of tractors, increased pressure on contractors	Reduction in passes, poorer cultivation- possibly lower yields for small seed crops.
Increased fuel prices	Increased contractor ploughing per ha rates	
Seeds		
Seed shortages ²² - local seeds	<p>Lack of local seeds carried-over from previous harvest is a concern for heavy seed rate cereals/pulses, e.g. <i>wheat, barley, oats</i> and <i>all pulses</i> (90 kg to 180 kg per ha).</p> <p>NOT usually a problem for low sowing rate cereals such as <i>sorghum, pearl millet</i></p>	<p>Vulnerability; IDPs>Transhumants>Settled</p> <p>Reduced sowing rates will probably reduce yields; Less seed selection means poorer quality seeds, poorer germination followed by reduced yields. Sowing dates slip as farmers search for seeds, missing the optimum sowing rate and leaving plants more vulnerable.</p>
Seed shortages ²³ improved seeds (hybrid and composite)	<p>Late arrival or overall shortage of hybrid seeds will increase seed prices/ reduce uptake and so reduce area sown to hybrids</p> <p>Late arrival of composite seeds</p>	<p>Commercial farmers affected may use local seeds resulting in reduced yields or they may switch crops</p> <p>Subsistence+ and commercial farmers affected, they may adjust sowing rates with possible reduced yield effect. Poorer quality seeds used leading to poor germination and reduced yield</p>
Seed failure	<p>Replanting (maybe more than once) - Untimely sowing.</p> <p>Possibly no alternative seeds</p>	<p>Increased pressure on seeds reduced sowing rates, untimely sowing all leading to reduced yields. Increased fallow areas</p>

Fertilizer²⁴		
Early availability of basal dressing fertilizer	Plenty available at sowing time. Prices stable	Correct application to both HRVs and local seeds means higher yields are expected
Late availability of basal dressing fertilizer Price increases	Shortages at sowing time- insufficient to meet demand. Prices increase and a black market flourishes. Less basal dressing used esp. by subsistence/subsistence + farmers	Reduced use of HRVs- decreased yields Reduced application by peasants who cannot afford parallel prices leads to reduced use and reduced yields
On-time availability of top dressing	Plenty available, prices stable-Correct application	Good growth especially of HRVs leading to higher yields of grains; and high yields of straw
Late availability of top dressing fertilizer Price increases	Shortages occur with price increases and a black market flourishes for commercial farmers	Top dressing window missed, commercial farmers reduce use Subsistence farmers stop using top dressing with a possible reduction in yields of grain but a definite reduction in straw yield
Labour		
Labour shortages early season	Land clearing affected, increased weed growth later	Weed induced yield reduction unless weeding frequency is increased later in year
Labour shortages mid-season	Wages increased, commercial farmers reduce weeding frequencies ²⁵	Weed induced yield reduction is to be expected
Labour shortages late-season	Wages increased, delayed harvesting. Increased in-field pre-harvest losses	Poor quality harvesting means yields may be reduced
Pests and diseases		
Migratory pests <i>viz</i> army worm, locusts, red-billed quelea (<i>quelea quelea</i>) may occur at any stage in the crop growth cycle with equal devastation	All farmers subject to widespread attacks unless coordinated (national and international) control measures are in place with usable chemicals and equipment	Devastating loss of yield in uncontrolled circumstances

Post-CFSAM attacks of migratory pests ²⁶	Destruction of remaining harvestable crops	Reduction of production, after mission leaves country will radically change assessment
Non- migratory pests; gregarious movers <i>viz</i> grass-hoppers, sorghum midge, bugs, local birds (finches)	Temporary infestations will cause losses and control may be economic. Local bird damage increased when labour reduced	Yields will be reduced but the losses, nationally, are rarely devastating. Chemical control in mechanized areas. Manual control is practical on small plots
Non-migratory pests; stationary/ solitary-stalk borers, termites, rodents	Endemic low level losses are expected	Occasional serious outbreak with build-up of infestations to economic levels allowing chemical treatment
Large mammals including baboons, monkeys, warthogs, elephants and hippos	Destruction and loss of plants all through season but particularly at harvest, near forests and national parks	High labour demand-24 hr per day animal and 12 hr day bird scaring near forests or woodland with coordinated action are needed
Weeds		
Striga (buda or witch-weed) Easily recognized plant-parasite of sorghum	Empty patches, striga rarely infests whole fields, germinating shoots destroyed pre-emergence; ²⁷	Localized problem whose effect is often greatly exaggerated unless it occurs a) in irrigated plots with no rotation or b) confined rain-fed fields where families or large scale contractors have no chance of shifting
Grass and broad leaf weeds of cereals	Weeds are endemic throughout all CFSAM countries- ubiquitous weeds can obscure whole fields of plants ²⁸ . Usually controlled up to 3 x per season per plot by hand weeding. Worse in good rain years	Far worse impact than striga, grass and broad leaf weeds negatively affect the yield of all cereals, heavy drain on household labour resources/high cost in commercial sector Serious yield reduction in un-weeded fields in good rainfall years

Fungal diseases		
Seed-borne <i>e.g.</i> smuts, bunts (sorghum, wheat, barley)	Problem mostly noted in commercial sector, seed treatment supported	Reduces commercial value of seed
	Heavy infection needs cultural action creating extra demands on labour	Reduces crop establishment, therefore yield
Storage Pests²⁹		
Universal problem in CFSAM countries - insects, moulds, rodents, birds	Infestation levels vary but are always exacerbated when wet/immature grain harvests are put into poor storage conditions	Few studies but losses likely to range from 10-40% depending on crops. Best guide to follow is: <i>the bigger the grain, the greater the loss.</i>
	Most serious pest large grain borer (LGB)	Losses 80% recorded in localities in Tanzania (short season CFSAM 1998)

²⁰ All the effects of dry-spells are less severe in fields of local landraces which have a much longer spread of dates for each physiological stage. The corollary is that HRVs are more vulnerable but they produce higher yields when all the conditions are favourable.

²¹ If floods widespread, the flood will be noted to have reduced area of main crop, not yield. Make sure the EPs have not done both!

²² Usually in CFSAM countries > 90% peasant farmers use their own seeds carried over from previous year

²³ Usually < 10% peasant farmers use purchased seeds in CFSAM countries.

²⁴ There is mixed utilization of fertilizer in peasant sectors; purchase of fertilizer is influenced by extension activities, cost of fertilizer, farm-gate price of commodity, credit availability and weather forecasts. A fall in use usually follows liberalization of central economies. Fertilizer is also a saleable commodity in its own right; internal and cross-border trade flourishes when regional differences in prices occur. A thriving black market causes a redistribution that may have serious yield implications if the fertilizer leaves the country.

²⁵ Maybe increases use of herbicides.

²⁶ Army worm, which tends to infest crops early in their cycle, is removed by heavy rains. Sudan- red-billed quelea may attack the late sorghum harvest, fundamentally affecting yields or areas harvested after the CFSAM has left.

²⁷ When purple-blue flowers are seen, the real damage is already done.

²⁸ Kosovo 1999, delayed harvesting caused whole fields to be completely obscured, combine harvesters produced 1 bag of weed seeds for every 2 bags of grain!

²⁹ Usually don't affect yield, get some attacks on standing grain crops left to dry in field. (south Ethiopia-1995)