

Table 1: Crop Management Summary- CFSH 30 Underseeding of Alfalfa

Planting date	Plant after 3 rd week of May on moist fine firm seed bed, when soil temperature is above 12 ^o C with no risk of frost. (Warm soil is needed for rapid emergence of CFSH 30 and growth).
Spacing	Between rows 7.0 inches and 3 to 4 inches apart within the row
Seed rate	10 lbs/acre of CHSH 30 and alfalfa 15 to 20 lbs/acre
Planting depth	Plant shallow CFSH 30 at 0.75 to 1.0 inch and alfalfa at 0.25 to 0.5 inches (Companion crop CFSH 30 should be slightly deeper than alfalfa)
CFSH 30	
Population	Target population of sorghum 250 000 plants/acre. (10 lbs/acre)
May	
June	Target population of sorghum 350 000 plants/acre. (13 lbs/ acre)
Planting equipment	Drill with Forage box for alfalfa Plus the Grain box for CFSH 30
Chart on Drill	Use 80 % of chart opening for Milo, Sorghum, or Sudangrass because the seed size of CFSH 30 is smaller than Milo, Sorghum or Sudangrass.
Fertilizer	Apply 50 lbs N per acre at planting plus 50 lbs of N after first cut. Follow Soil Test and Forages Recommendation for Macro and Micro nutrients for Alfalfa short and long term performance
Soil pH	Optimum soil pH 5.5 – 7.5
Broad leaf weed control	EMBUTOX 0.5 litre/acre + MCPA 0.028 litre/acre at second trifoliolate stage of alfalfa (Consult OMAF Publication # 75).
Harvesting	Harvest with a forage harvester. First cut is ready at 55 to 60 days after planting. High protein & optimum forage quality of CFSH 30 at boot stage, ie: plants are about 3 feet tall. 2 nd cut, 30 days later. 3 rd cut 5 to 10 days after a killing frost, may leave it to protect alfalfa.
Harvest height	Leave 4- 6 inches of CFSH 30 stubble for re-growth ie—14 tillers
Harvest moisture	65 - 70% at harvest and it could be used directly for making silage.
Uses	Silage and Balage. Dry hay has been done with tedder in four days.
Dry matter	Forage dry matter in first year would be 25- 30% more than the mono crop alfalfa
Benefit	Farmer has economic gain of 25 to 30% more yield per acre with CFSH 30 Underseeded with alfalfa compared to Direct seeding
Remarks	CFSH 30 does not over winter.

Fig 1: Forage dry matter yield (kg/acre) of alfalfa and CFSH 30 alfalfa mixed crop in Ontario

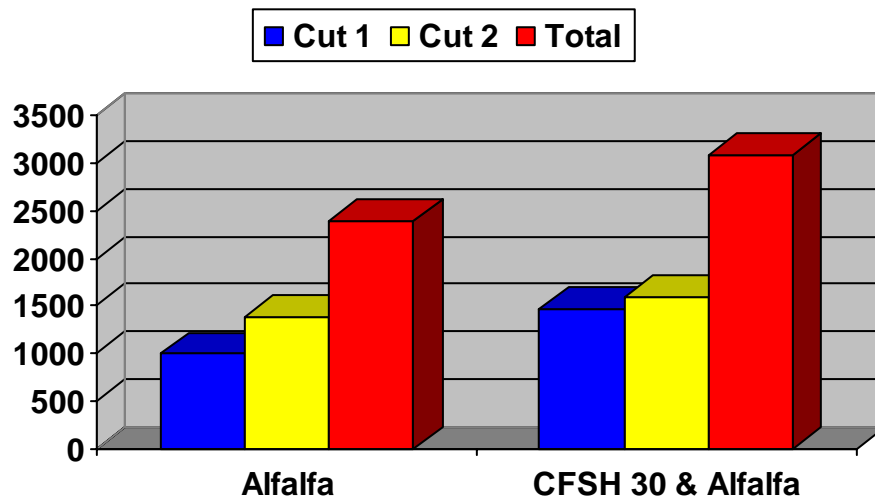


Table 2: Forage quality (% dry matter) of alfalfa and CFSH 30 alfalfa mixed crop in Ontario

Feed	DM (%)	CP	TDN	NDF	ADF	Lignin	DE (Mcal/kg)	Ca	P	K
CFSH 30 & alfalfa	44	19.4	61.1	49.3	31.4	6.7	2.55	1.1	0.30	2.56
Alfalfa	22	19.2	56.4	41.6	32.8	7.6	2.60	1.4	0.20	2.30

Table3: Cost of ration of alfalfa and CFSH 30 alfalfa mixed crop in Ontario

Feed	Cost/100 kg dm ration	Cost \$ /cow/ day	Cost difference(\$/cow/ day)
Alfalfa + CFSH 30 silage	22.17	5.32	control
Alfalfa silage	25.29	6.07	+ 0.75

Cost\$ /cow/ day was calculated based on dry matter intake of 24 kg/cow/day

Benefits of CFSH 30 Underseeding in Alfalfa

- ▶ Use of CFSH 30 with alfalfa showed increase in forage dry matter yield (32%) (Fig 1) and its quality (low ADF and higher in TDN, CP and NEL) (Table 6)
- ▶ Farmer has economic gain of \$90 per acre with CFSH 30 under seeding in alfalfa as compared to the sole crop.
- ▶ Both dairy and beef cattle highly accepted CFSH 30 as choice of hay, baylage and silage compared to other mixture because of sweetness.
- ▶ Planting of CFSH 30 in alfalfa yielded higher, if sowing date is after 20th May, when soil temperature above 12° Celcius.
- ▶ CFSH 30 in alfalfa cropping system showed the benefit that no additional input is required and silage can be made at any time including third cut as CFSH 30 has very low prussic acid.

Table 4: Crop Management Summary- CFSH 30 Monocrop

Planting date	Plant in 3rd week of May , when soil temperature is above 12^oC with no risk of frost . (Warm soil is needed for rapid emergence and growth).
Spacing	Between rows 7 inches and 2 to 3 inches apart within the row.
Seed size	CFSH 30 seeds are small with 30,000seeds/lb.
Seed rate May 20-31	12lbs/acres
June 1-15	14 lbs/acres
June 16++	16 lbs/acres
Planting depth	Plant shallow at 0.5 inch. On sandy soils seed should be planted slightly deeper at 1.0 inch
Population May	Target population 300 000 plants/acre.
June	Target population 350 000 plants/acre.
July	Target population 400 000 plants/acre.
Planting equipment	Use a grain drill with a grass box or conventional grain drill. Broad casting of seeds works but the results is an uneven stand. Use 80 % of chart opening for Milo, Sorghum, or Sorghum X Sudangrass because the seed size of CFSH 30 is smaller.
Fertilizer	Apply 80 lbs N and 30lbs P and 75lbs K per acre at planting plus 50 lbs of N after first cut. Use about 70% of forage corn fertilizer based on soil test. Follow Soil Test and Forages Recommendation for Macro and Micro nutrients.
Soil pH	Optimum soil pH 5.5 – 7.5.
Grass weed control	Glyphosate Application or Cultivation Just Prior to Planting
Broad leaf weed control	Following herbicides are registered for broad leaf control in Ontario. 1) PEAK 75WG 13.3 g/ha plus BANVEL-280 at 0.3%, 2) BASAGRAN Forte 1.75-2.25 L/ha, 3) 2,4 -D 0.5-1.0 L/ha. Herbicide should be used at 4-6 leaves stage of crop (Refer OMAF Publication # 75) .
Harvesting	Ready at 50 to 60 days after planting. Optimum forage quality at boot stage ie: CFSH 30 is 3 feet tall. Schedule the 2 nd cut 30 days after first cut.
Harvest height	Leave 4 to 6 inches of stubble for faster re-growth.
Harvest moisture	65 – 70 % at harvest.
Forage Yield Quality	Forage dry matter yield 7-11 t/ha (from all cuts). Forage quality (in % dry matter) was 14-16% crude protein (CP), 28 -32% acid detergent fiber (ADF) 56-59 % neutral detergent fiber (NDF) and 66-70% total digestible nutrients (TDN) and net energy lactation (NEL) of 1.45- 1.51 (Mcal/kg) in Ontario and Quebec.
Uses	Silage, green chop, hay, baylage and pasture.
Grazing	Allow crop to reach 1.5 to 2 feet and rotate the animals by leaving 6 to 8 inches of stubble for re-growth.

CFSH 30 as Cover crop:

Plant at CFSH 30 at 16-20 lbs/acre at between rows 7 inches and 2 to 3 inches apart within the row after 3rd week of May, when soil temperature is above 12^oC with no risk of frost with a grain drill and a grass box. Broad casting of seeds results in uneven stand.

Benefits of CFSH30 cover crop

Organic matter	CFSH 30 can add significant amounts of biomass and build organic matter in soil. Sorghum stays dormant during drought and recovers with rain. Chop plants when it reaches over 3 feet with a rotary mower by leaving over 6 inches of stubble for re-growth. Mowing will encourage the plants to root more deeply and will keep them from not getting too woody. The last re-growth can be left standing over the winter to provide soil cover and reduce soil erosion. In the next spring all the crop residues should be incorporated into the soil by plowing down in the spring.
Soil improvement	Aggressive root system of CFSH 30 will improve soil structure by loosening sub soil and hard pans.
Erosion control	Provides soil conservation alternative than summer fallowing by providing soil cover due to the excellent drought and heat tolerance nature of the crop.
Nutrient management	Heavy feeder of nutrients due to the crop biomass and extensive root system. Mass of fibrous roots in CFSH 30 can reach over 4 feet and take nutrients and water. CFSH 30 would enhance the N cycling in soil system and reduce nitrate leaching to the under ground water.
Weed control	Due to the aggressive growth of CFSH 30 at high density it can suppress weeds by competition.
Over-wintering	CFSH 30 would not over-winter. Frost will kill the plants.

Table 5: Biomass nutrients of CFSH 30 and common cover crops

Crop	Dry matter Yield (ton/ac)	N (kg/ac)	P ₂ O ₅ (kg/ac)	K ₂ O (kg/ac)	Nutrients(\$/ac)
CFSH 30	3.0	48.0	9.3	69.0	34.45
Cereal rye	2.0	25.0	4.5	32.0	16.81
Red clover	1.6	50.4	5.4	37.6	26.00