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Reducing the European Union's plant protein deficit: Options and impacts

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Electronic supplementary material

Supplementary Tables S1–S5

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Table S1. Land use changes, in 2030 compared to the baseline in each of the scenarios

Scenario	Changes (1 000 ha)				Percentage changes (%)			
	COMB	SUPP	YLD	ILUC	COMB	SUPP	YLD	ILUC
Maize	-6.25	-3.98	-1.21	-1.04	-0.07	-0.05	-0.01	-0.01
Other coarse grains	-48.17	-31.73	-8.38	-7.98	-0.25	-0.16	-0.04	-0.04
Rice	-0.20	-0.14	-0.03	-0.03	-0.05	-0.03	-0.01	-0.01
Wheat	-33.19	-22.12	-5.57	-5.43	-0.14	-0.09	-0.02	-0.02
Soya bean	28.10	9.82	18.68	-0.51	2.08	0.73	1.38	-0.04
Rapeseed	3.74	-5.91	-1.70	11.40	0.07	-0.11	-0.03	0.22
Sunflower seed	2.35	-4.32	-1.45	8.14	0.06	-0.10	-0.03	0.19
Pulses	73.04	71.16	3.11	-1.36	3.31	3.22	0.14	-0.06
Roots and tubers	-1.03	-0.69	-0.19	-0.15	-0.09	-0.06	-0.02	-0.01
Sugar beet	-0.67	-0.47	-0.11	-0.09	-0.05	-0.03	-0.01	-0.01
Cotton	-0.29	-0.45	-0.08	0.24	-0.09	-0.14	-0.02	0.07
Non modelled crop areas	6.06	4.75	0.60	0.76	0.03	0.03	0.00	0.00
Pasture and fodder	-12.97	-8.79	-2.00	-2.20	-0.02	-0.01	0.00	0.00
Total agricultural area	10.52	7.12	1.69	1.75	0.01	0.00	0.00	0.00

For scenario descriptions, see Table 1

Source: Own calculations based on output from the Aglink-Cosimo model (OECD/FAO 2020)

Table S2. Price and production impacts, in 2030 compared to the baseline (percentage changes) in each of the scenarios

Scenario	COMB		SUPP		YLD		ILUC	
	price	prod	price	prod	price	prod	price	prod
Meat								
Sheep	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beef and veal	-0.01	0.01	0.00	0.00	-0.01	0.00	0.00	0.01
Pork	-0.01	0.02	0.00	0.00	-0.01	0.01	-0.01	0.02
Poultry	0.00	0.01	0.00	-0.01	0.00	0.00	0.00	0.01
Dairy								
Cheese	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
Butter	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Grains								
Wheat	0.05	-0.14	0.03	-0.09	0.01	-0.02	0.01	-0.02
Maize	0.02	-0.07	0.01	-0.05	0.00	-0.01	0.01	-0.01
Other coarse grains	0.17	-0.22	0.11	-0.15	0.03	-0.04	0.03	-0.04
Rice	0.00	-0.05	0.00	-0.03	0.00	-0.01	0.00	-0.01
Other cereals	0.33	-0.21	0.21	-0.13	0.06	-0.04	0.06	-0.04
Oilseeds and pulses								
Soybean	-0.23	7.56	-0.02	0.75	-0.19	6.80	-0.02	-0.04
Rapeseed	1.08	0.15	0.11	-0.11	0.01	-0.03	0.95	0.29
Sunflower seed	-0.16	0.04	0.10	-0.09	0.02	-0.03	-0.29	0.16
Pulses	-4.41	6.42	-2.02	2.92	-2.21	3.16	0.05	-0.05
Biofuels								
Biodiesel	3.71	-3.19	0.01	-0.01	0.00	0.00	3.70	-3.18
Ethanol	0.02	-0.02	0.01	-0.01	0.00	0.00	0.00	0.00
Other processed products								
Total protein meal	-0.19	0.21	0.02	-0.01	0.02	0.03	-0.22	0.19
Vegetable oils	2.36	0.33	0.02	-0.02	0.01	0.00	2.34	0.35
Sugar	0.04	-0.05	0.02	-0.04	0.00	-0.01	0.02	0.00

For scenario descriptions, see Table 1

Source: Own calculations based on output from the Aglink-Cosimo model (OECD/FAO 2020)

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Table S3. Changes in vegetable oil use by source and crop, in 2030 compared to the baseline (1 000 t) in SCEN_COMB

	Biodiesel	Food	Other uses	Exports	Total
Rapeseed					
Oil (from EU seed/beans production)	100	-78	-2	-29	-9
Oil (from seed/beans imported)	52	-14	0	-7	32
Imported rapeseed, soya bean, sunflower oil	139	27	2	0	168
Soya bean					
Oil (from EU seed/beans production)	22	20	2	15	58
Oil (from seed/beans imported)	26	-30	-2	-35	-41
Imported rapeseed, soya bean, sunflower oil	10	4	0	0	15
Sunflower					
Oil (from EU seed/beans production)	13	-2	0	-6	5
Oil (from seed/beans imported)	1	-2	0	-1	-2
Imported rapeseed, soya bean, sunflower oil	9	13	0	0	22
Total					
Oil (from EU seed/beans production)	135	-59	-1	-20	55
Oil (from seed/beans imported)	79	-45	-2	-42	-11
Imported rapeseed, soya bean, sunflower oil	158	44	3	0	205
Imported palm oil	-745	43	1	0	-702
Total change	-373	-17	1	-63	-453

For scenario descriptions, see Table 1

Source: Own calculations based on output from the Aglink-Cosimo model (OECD/FAO 2020)

Table S4. Changes in vegetable oil use by source and crop, in 2030 compared to the baseline (1 000 t) in SCEN_ILUC

	Biodiesel	Food	Other uses	Exports	Total
Rapeseed					
Oil (from EU seed/beans production)	106	-76	-2	-28	0
Oil (from seed/beans imported)	49	-15	0	-7	27
Imported rapeseed, soya bean, sunflower oil	137	27	2	0	166
Soya bean					
Oil (from EU seed/beans production)	11	-2	0	-5	4
Oil (from seed/beans imported)	36	-9	0	-18	10
Imported rapeseed, soya bean, sunflower oil	11	5	0	0	16
Sunflower					
Oil (from EU seed/beans production)	13	1	0	-6	9
Oil (from seed/beans imported)	1	-3	0	-1	-3
Imported rapeseed, soya bean, sunflower oil	9	12	0	0	21
Total					
Oil (from EU seed/beans production)	131	-77	-2	-38	13
Oil (from seed/beans imported)	86	-26	-1	-25	34
Imported rapeseed, soya bean, sunflower oil	156	44	3	0	203
Imported palm oil	-745	42	1	0	-702
Total change	-372	-17	1	-64	-452

For scenario descriptions, see Table 1

Source: Own calculations based on output from the Aglink-Cosimo model (OECD/FAO 2020)

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Table S5. Changes in EU vegetable protein meals use by source, in 2030 compared to the baseline (1 000 t) in each of the scenarios

Scenario	Rapeseed	Soya bean	Sunflower	Total
SCEN_COMB				
Meal (from EU seed/beans production)	22	213	-1	235
Meal (from seed/beans imported)	51	-223	-3	-175
Imported rapeseed, soya bean, sunflower meal	-12	-10	6	-16
Exported rapeseed, soya bean, sunflower meal	12	0	0	12
Total change	74	-19	2	57
SCEN_SUPP				
Meal (from EU seed/beans production)	-9	21	-3	9
Meal (from seed/beans imported)	5	-18	1	-12
Imported rapeseed, soya bean, sunflower meal	1	1	1	3
Exported rapeseed, soya bean, sunflower meal	-1	0	0	-1
Total change	-4	4	0	0
SCEN_YLD				
Meal (from EU seed/beans production)	-3	193	-1	189
Meal (from seed/beans imported)	1	-182	0	-181
Imported rapeseed, soya bean, sunflower meal	0	-8	0	-8
Exported rapeseed, soya bean, sunflower meal	0	0	0	0
Total change	-2	3	0	0
SCEN_ILUC				
Meal (from EU seed/beans production)	34	-2	4	36
Meal (from seed/beans imported)	45	-22	-4	19
Imported rapeseed, soya bean, sunflower meal	-13	-2	4	-11
Exported rapeseed, soya bean, sunflower meal	13	0	0	13
Total change	80	-26	3	57

For scenario descriptions, see Table 1

Source: Own calculations based on output from the Aglink-Cosimo model (OECD/FAO 2020)