Crop production in Iraq

The way forward

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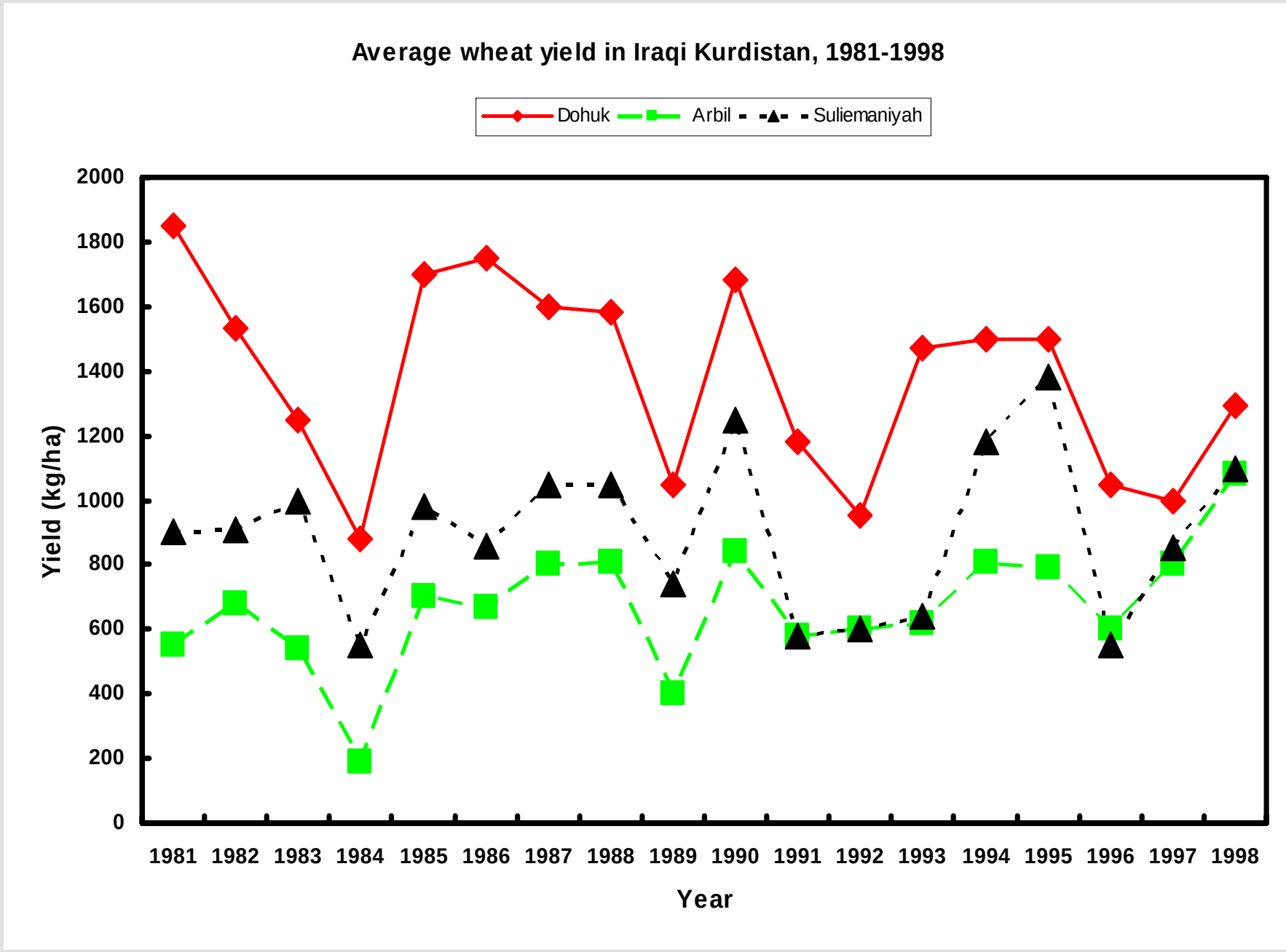
The situation at present

* Crop yields are low, often only 20 – 30% of well-managed crops.
* About 78% of food supplies are imported.
- Soil fertility has declined (Organic carbon often <1%, soil compaction, erosion, crusting)
- The ratio of land to people is about 0.4ha/person. This implies that:-
  - More land is needed for agriculture or
  - Yields need to be increased or
  - More food must be imported


Average wheat yield in Iraqi Kurdistan, 1981-1998
Dohuk
Arbil
Suliemaniyah
Yield (kg/ha)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
Year

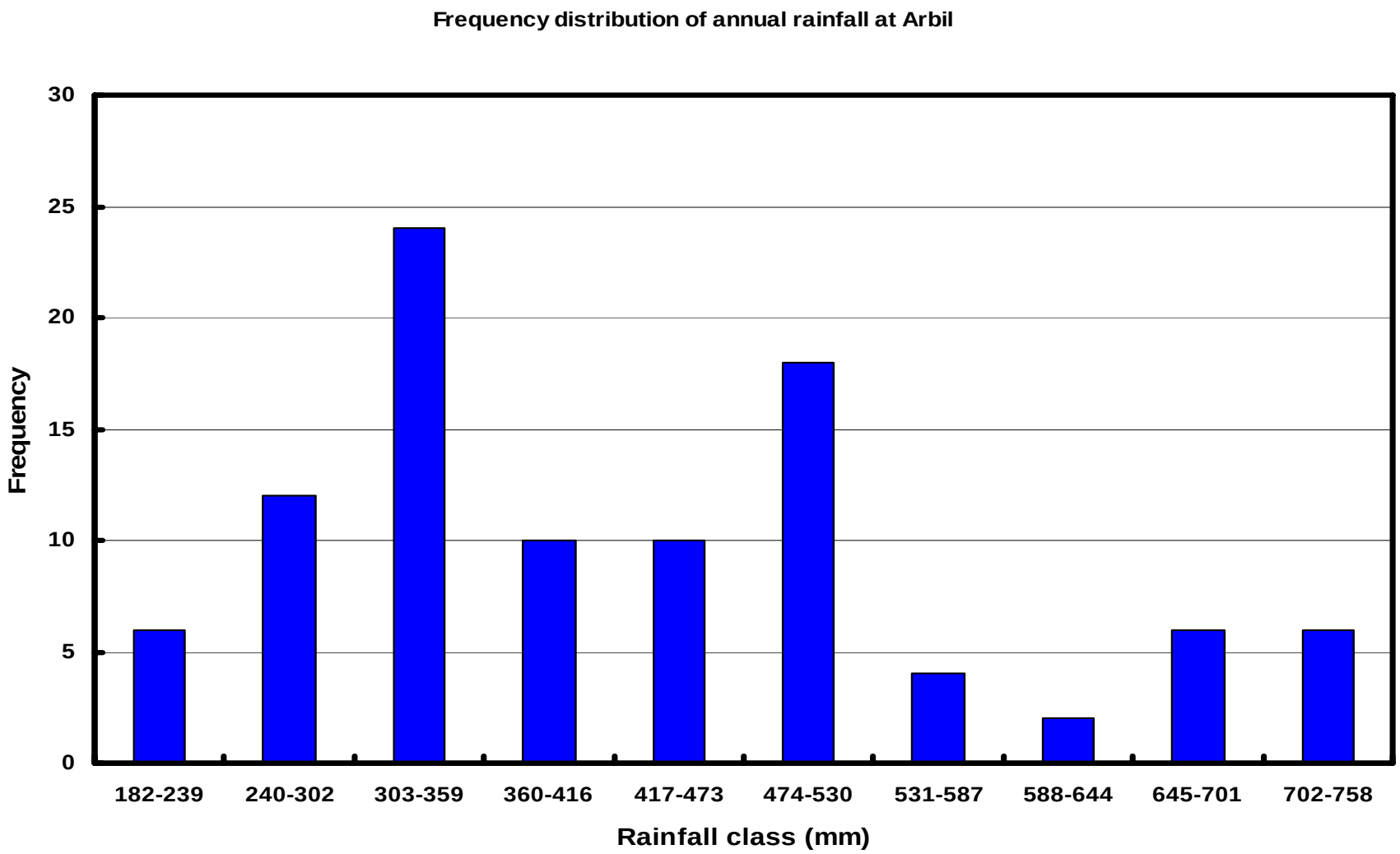
Soil fertility – some indicators

[data from Silanpaa, M (1990) FAO Soils bulletin No. 63]

Location	Organic Carbon (%)	CEC (me/100g)	pH	Nutrient Deficiencies
Dohuk	0.8	36.6	7.73	Zn
Suliemaniyah	0.9	33.1	7.86	N, P, K, Zn
Arbil	0.5	11.7	7.77	Zn

Rainfall – average and frequency, 1942/3 – 1998/9.

Long term average at Arbil = 415mm.



What is the potential yield for rain fed cereals in Northern Iraq?

- Assume seasonal rainfall is 350 mm
- Assume losses through soil evaporation and run-off are high – 150 mm
- Assume a conservative transpiration efficiency of 15 kg/ha/mm for wheat.

- Potential yield = [350-150] x 15 = 3,000 kg/ha (or 750 kg/donum).

What changes can assist in raising grain yields?

Reduced cultivation and direct drilling

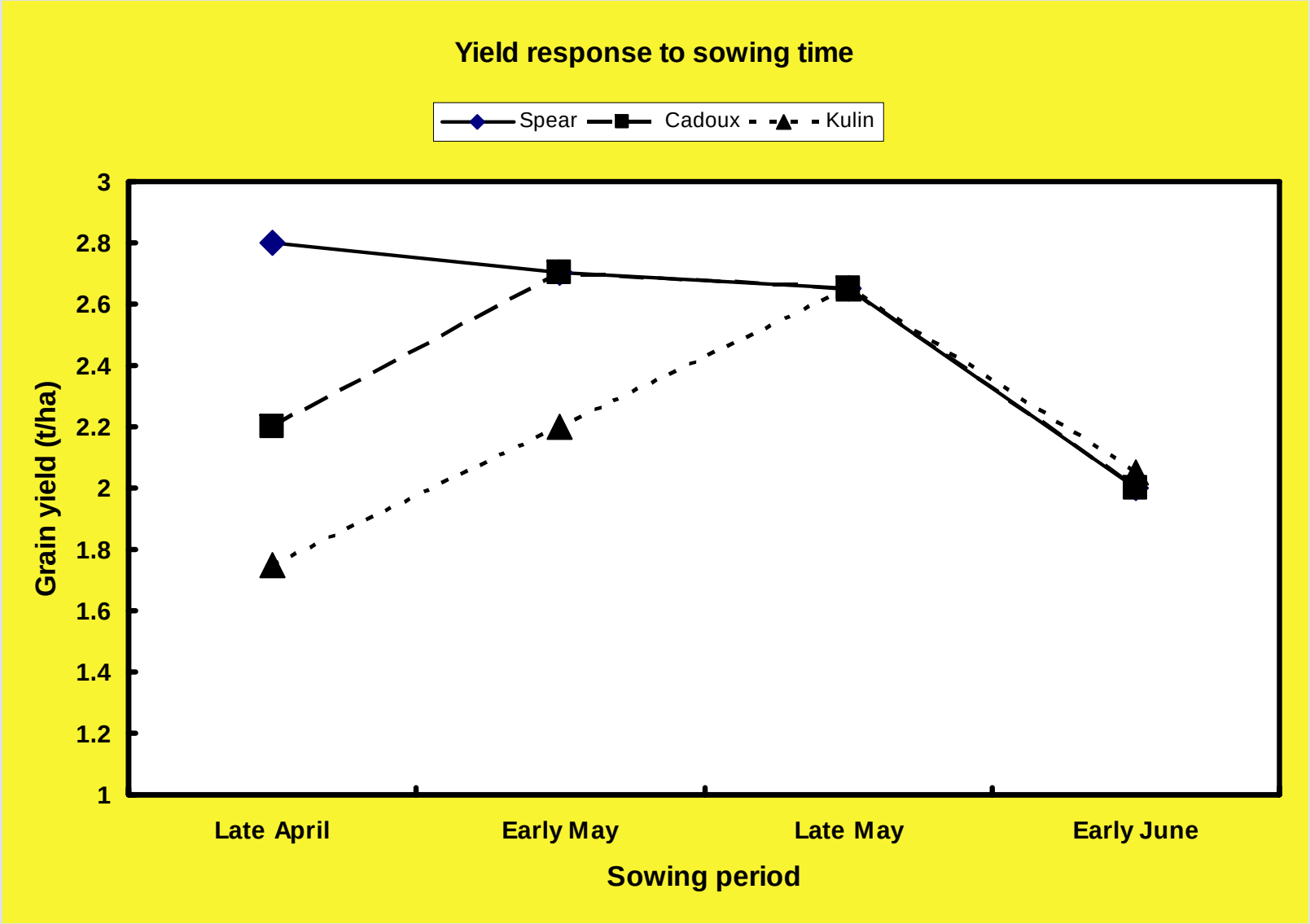
[Data from field experiments over 6 years in WA - Jarvis]

Seeding System	Wheat yield (t/ha)	Gross margin ($A/ha)
* Three cultivations including seeding	0.79	-63
* One cultivation then direct seeding	1.21	+39
* Sow and cultivate at the same time	1.38	+79

Weed control before seeding

- **Desiccant (non residual) herbicides (glyphosate or bipyridyls) can be as effective as cultivation.**
- **One or two applications before sowing can be sufficient to control most weeds**
- **Use of desiccant herbicides can assist soil fertility since water and organic matter are not lost by cultivation**
- **Direct sowing with minimum or no tillage can then proceed 2-3 weeks before cultivated fields**

Match variety to sowing time
[data from experiments in WA]



Response to fertilizer inputs on early and late sown crops (t/ha)

Sowing Time	N Applied (kg/ha) 0	40	Yield increase (kg grain/kgN)
Early	1.92	2.46	13.5
Late	1.75	1.88	3.3

Return crop residues to the soil

Wheat yield and soil properties after 9 years of retaining residues at Merredin (LRF)

	Removed	Returned
Organic carbon (%)	1.01	1.11
Bulk Density (g/cc)	1.61	1.57
Grain yield (t/ha)	3.29	3.76
(kg/donum)	823	940

Legume pasture increases wheat yield (t/ha) and protein (%) [after Rowlands 2000]

System	Wheat yield	Wheat protein
Continuous Wheat	1.20	9.4
Pasture/ Wheat	1.58	12.0

Grazing animals increase soil strength

(after Ballenger 2001)

Depth	Soil strength (MPa)	
(cm)	Grazed	Not grazed
5	0.6	0.4
10	1.0	0.6
15	1.25	0.65
20	1.15	0.65
25	0.85	0.6
30	0.75	0.55

How much does variety increase wheat yield?

- **Many studies have shown that about 70% of yield increases come from management, 30% from varieties.**
- **BUT the greatest increases come from improved management and new varieties TOGETHER.**

Responses of Semi-dwarf cultivars to management [data from 7 experiments in WA]

Management	Yield (t/ha)		
	Tall Cultivar	Semi-dwarf Cultivar	Increase due to Cultivar
Old management [late sowing, 0N, low seed rate]	2.62	2.69	0.07
New management [early sowing, 50kg/ha N, high seed rate]	3.05	3.62	0.57
Increase due to Management	0.43	0.93	

Barley in Northern Iraq – 5 sites, in 2005 – low & medium rainfall

Management	A Aswad	Zanbaker	Diff.
Farmer (control)	1080	1177	+97
Improved (demo)	1139	1382	+243
Diff.	+59	+205	

Steps to the future
[slowly, one step at a time, with consultation]

- **Sow all crops with reduced or zero tillage (allows earlier sowing)**
- **Control weeds with desiccant herbicides before sowing.**
- **Sow forage legume crops (peas, vetches, cowpeas, lathyrus) in the rotation.**
- **Feed animals legume hay instead of straw.**
- **Keep all animals off crop fields.**
- **Return all crop residues to the soil**
- **Increase fertilizer use to at least 30kg/ha of N + 3kg/ha of P for every tonne of expected yield.**
- **Adopt new varieties if they have an advantage.**

Wheat yield trend in Western Australia