Possibilities and challenges of large agricultural UAVs in Europe and in Finland

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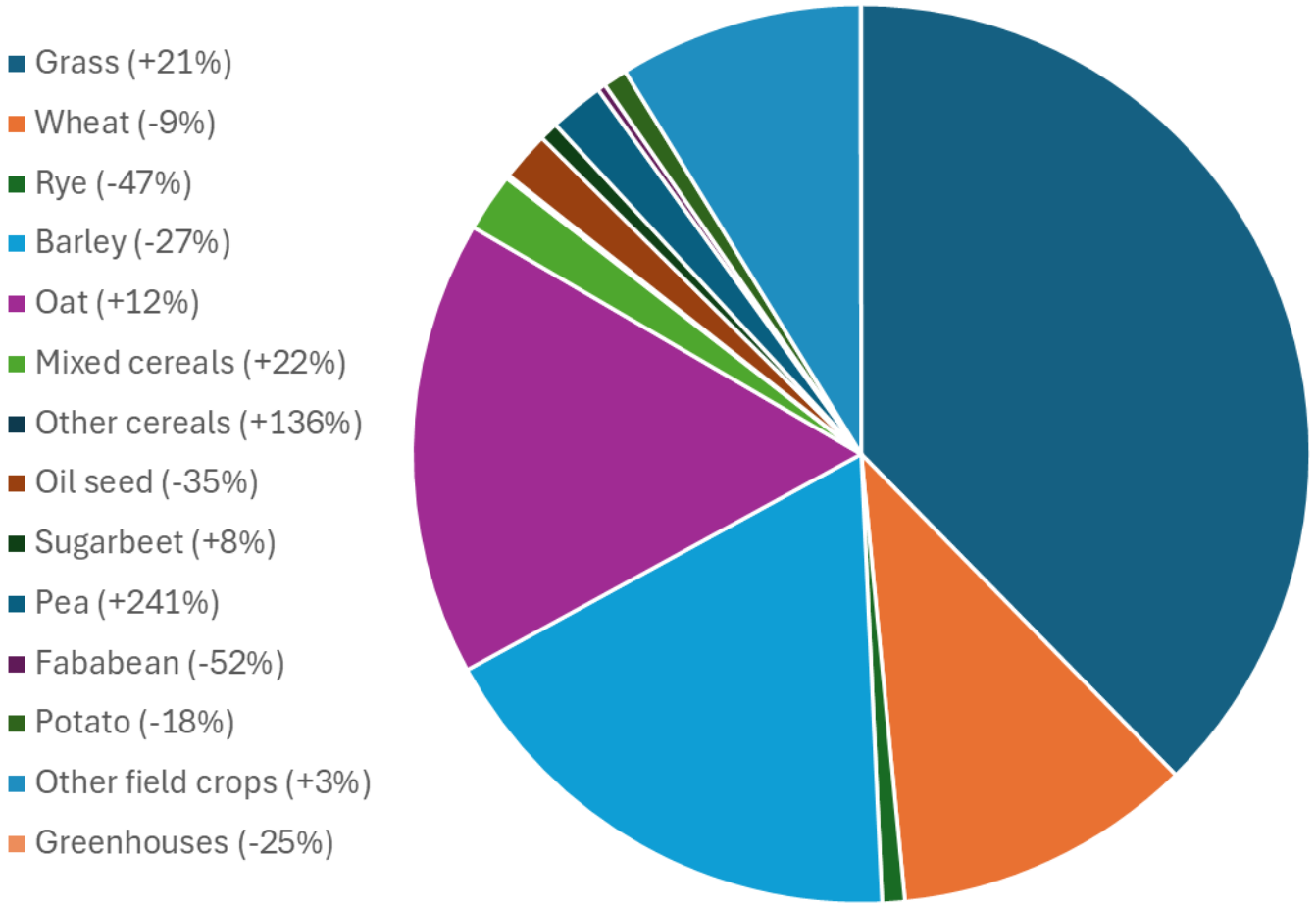
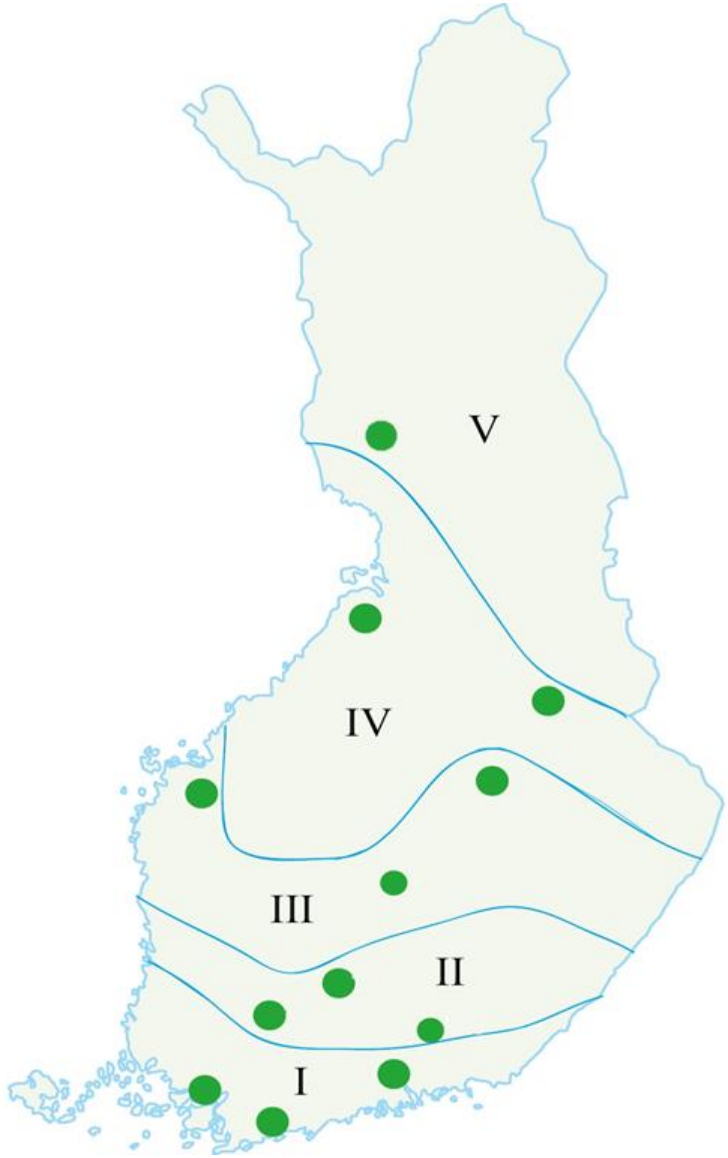
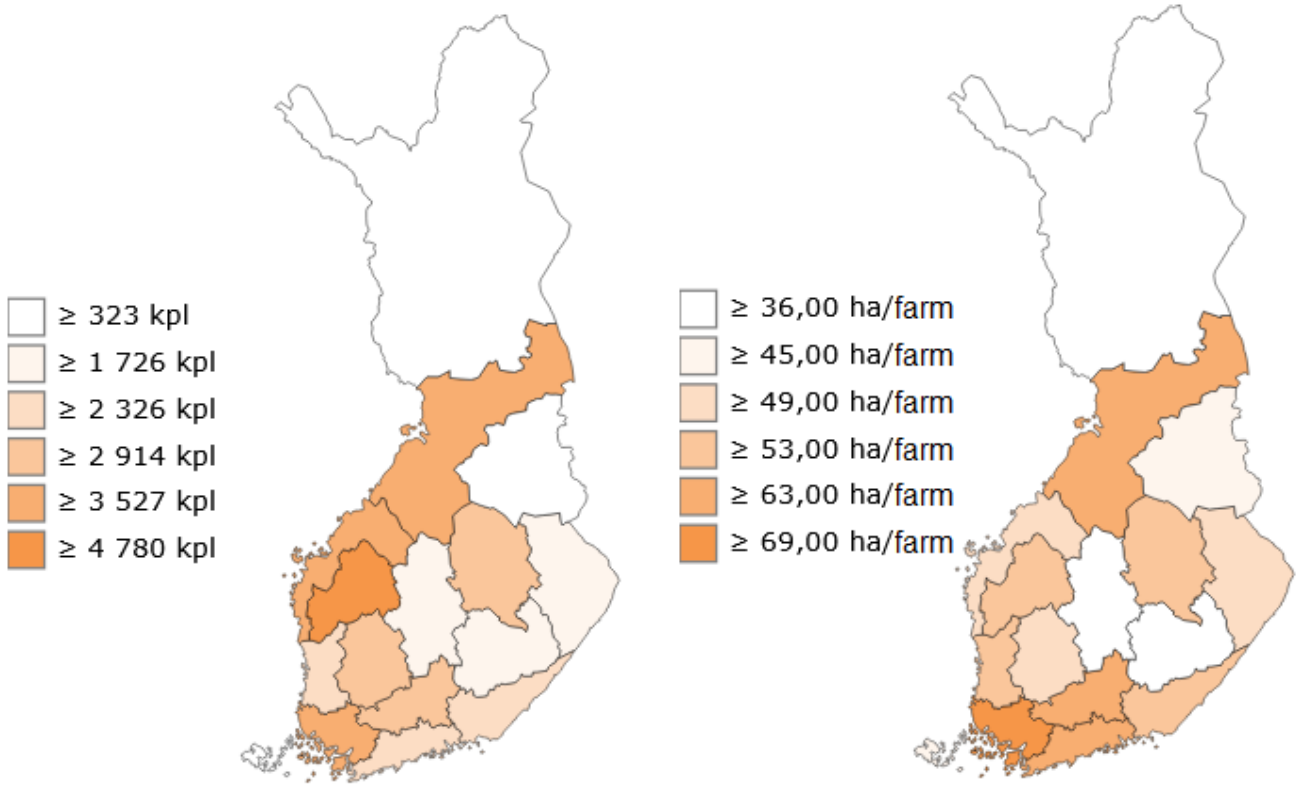
Agricultural production and climate in Finland

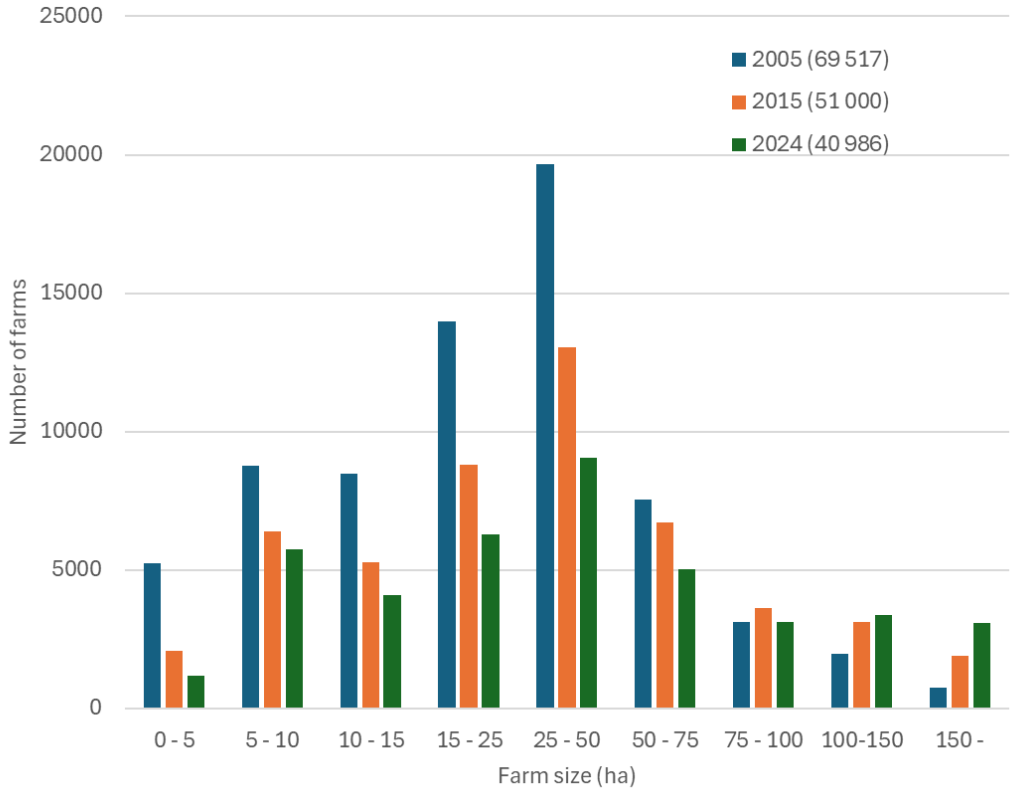




Source:
Luke

Crop production and farms in Finland





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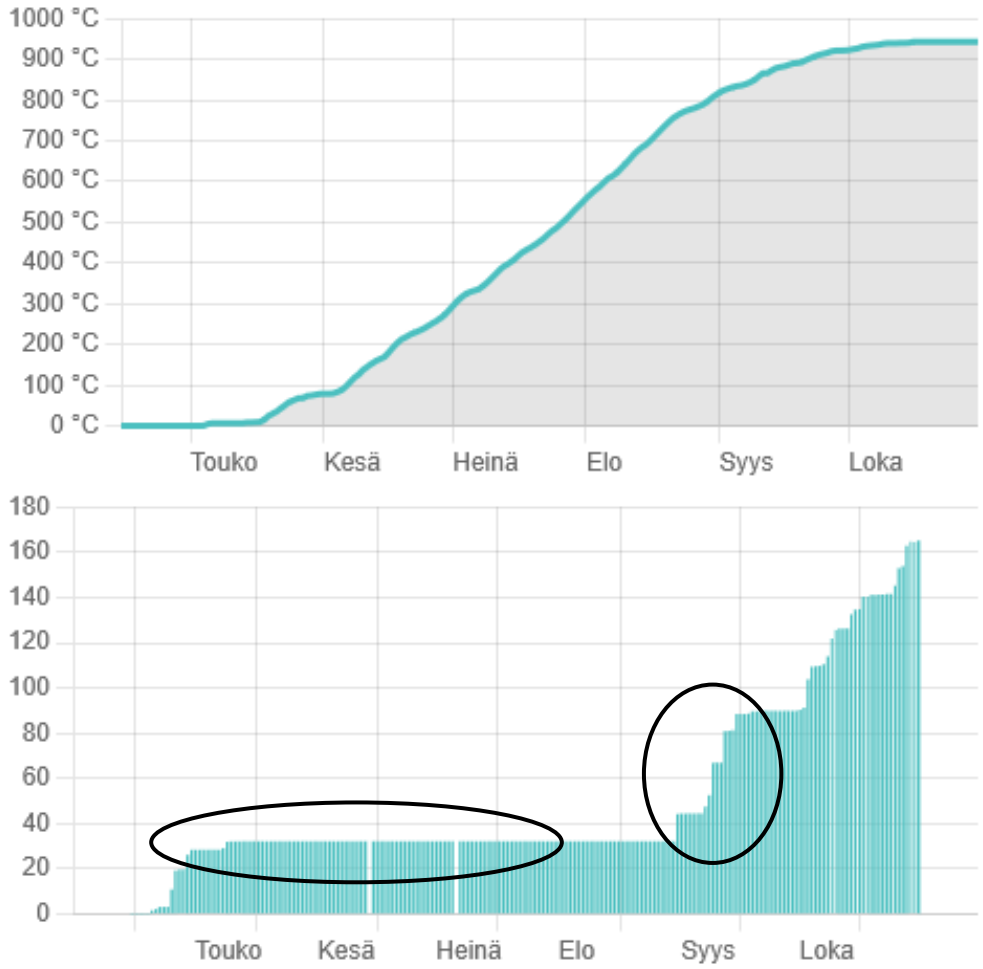
Challenges in crop production

- Short and hectic growing season
- Uncertainty of precipitation in spring
- Uncertainty of dry seasons in autumn
- Parcel size is low on average
- Long distances to fields



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Opportunities by drones

- Early fertilizer applications in spring
- Responding to prevailing growth conditions
- Agile deployment to fields with
  - various sizes
  - diverse locations
- Rapid deployment

Area	4,04 ha
Flight distance	6733 m
Flight time	8 minutes 8 seconds

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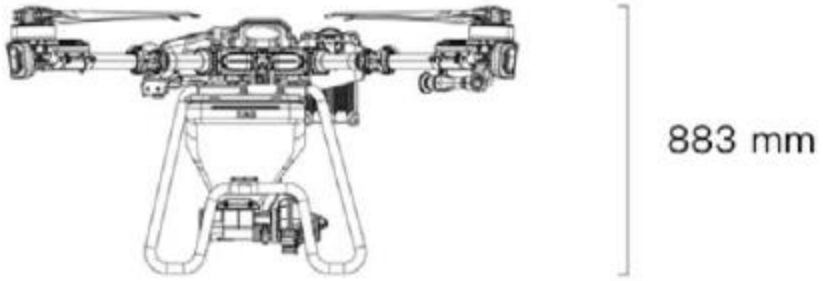
Granular fertilizers with drones



- Spread rate150 kg/min
- Flight speed 13,8 km/h (max)
- Spreading width 3-7 m
- Adaptable granule size 1-6 mm

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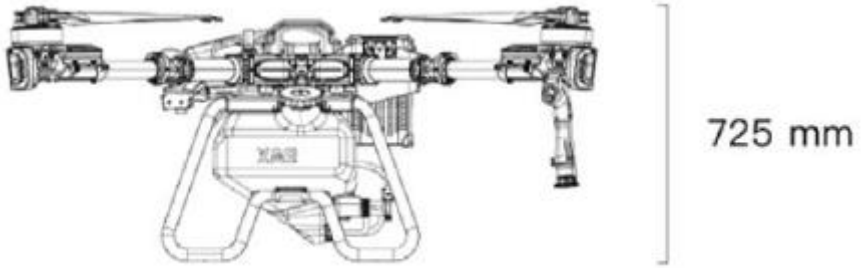
Spraying with drones



- Flow rate 22 l/min
- Flight speed 13,8 km/h (max)
- Spray width ~5 m
- Droplet size 60-400 µm

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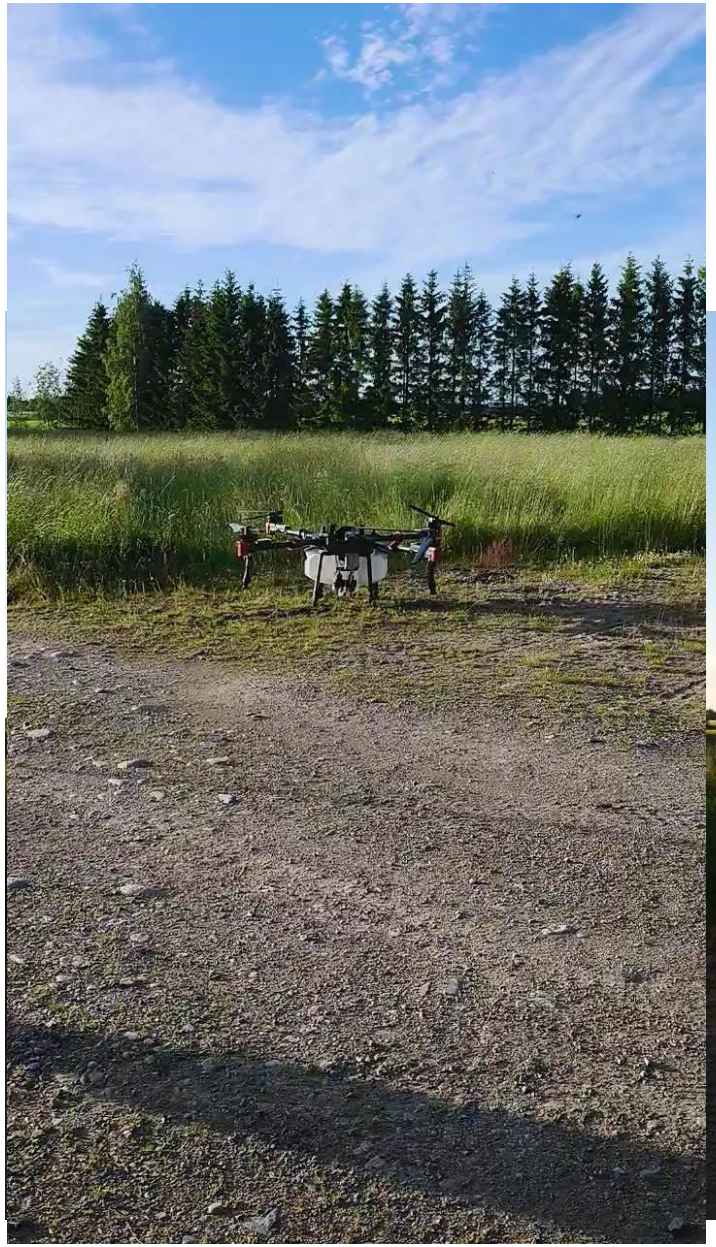
Next technological leap in agriculture?



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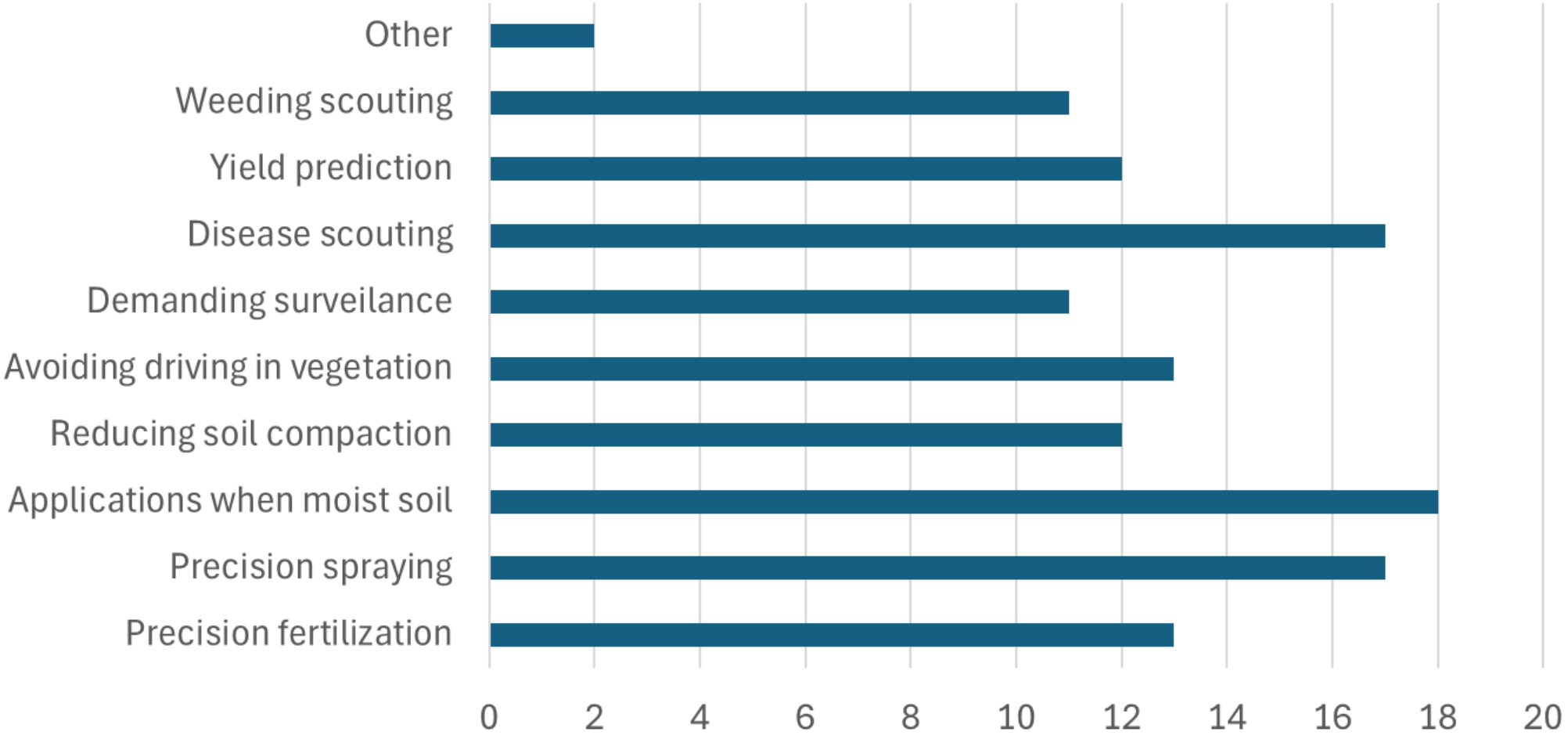
Expected advantages by farmers (n=26)



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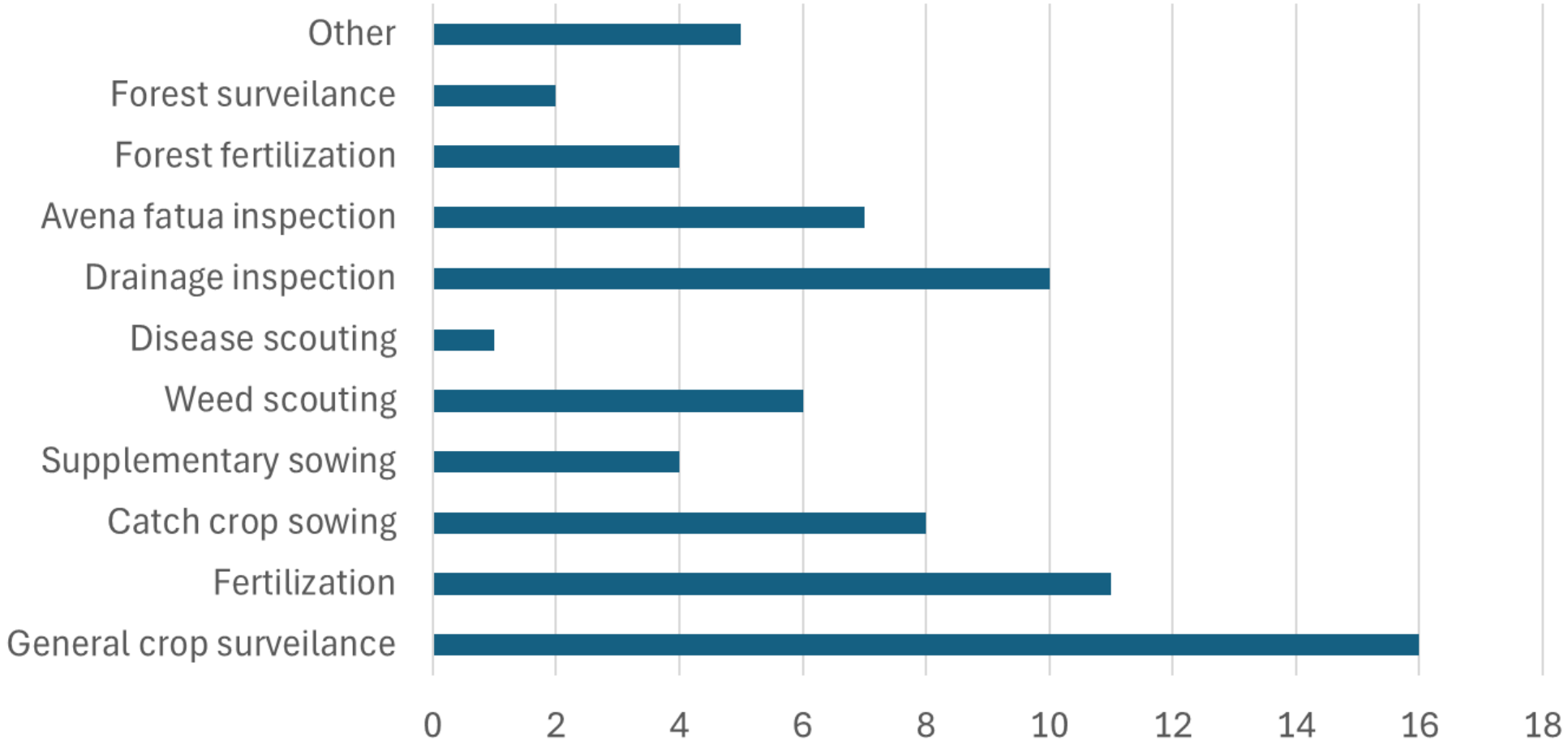
Where farmers would adopt drones on their own farm? (n=26)



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Remaining challenges in drone deployment

Fertilization

- ✓ Spring fertilization for grass
- ✓ Spring fertilization for cereals
- ✓ Additional fertilizations during growing season
- ❑ Uniformity of spreading
- ❑ Integration between fertilization planning and drones
- ❑ Work documentation

Spraying

- ❑ Drift
- ❑ Uniformity of spraying and droplet size
- ❑ Spraying width vs wind conditions
- ❑ Risk assesment for flying spray unit

Energy consumption:
Fuel or electricity used per ha treated
or kg/l product applied?

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Thank you!
Questions?
Remarks?

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