

Mycorrhizza and beneficial soil bacteria trials of Hungary



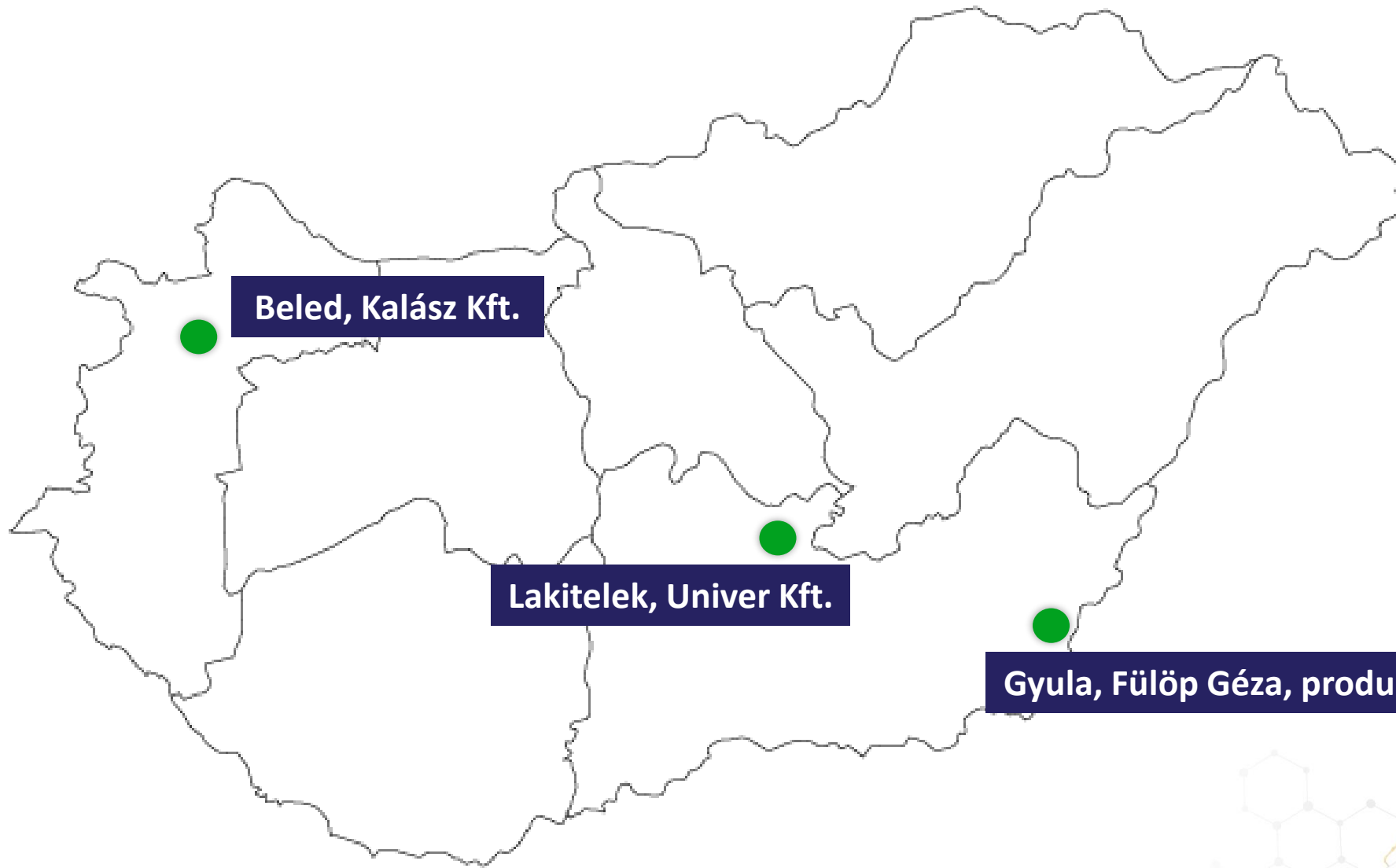
asfertglobal

innovation in plant sciences

László Kéki
Ádám Hodász
Andrea Tímea Tóth
2023. October



Kertcenter.com



Beled, Kalász Kft.

Lakitelek, Univer Kft.

Gyula, Fülöp Géza, producer



HUNGARY – PhD topic

Genetical and physiological effects of arbuscular mycorrhiza and bacteria in plant water stress tomato tolerance

Collaboration with Lisboa University and MATE and Asfertglobal

Researches starts in February, 2024 – open field and greenhouse



Technological solution based on microorganisms, accelerates seed and seedling development and guarantees stronger and healthier roots.

Mycoshell

Mycoshell
Dripper

Mycoshell
Tabs

Mycoshell
Tray

Control



Mycoshell Dripper

Hungary, Gyula, Fülöp Géza, producer

innovation in plant sciences



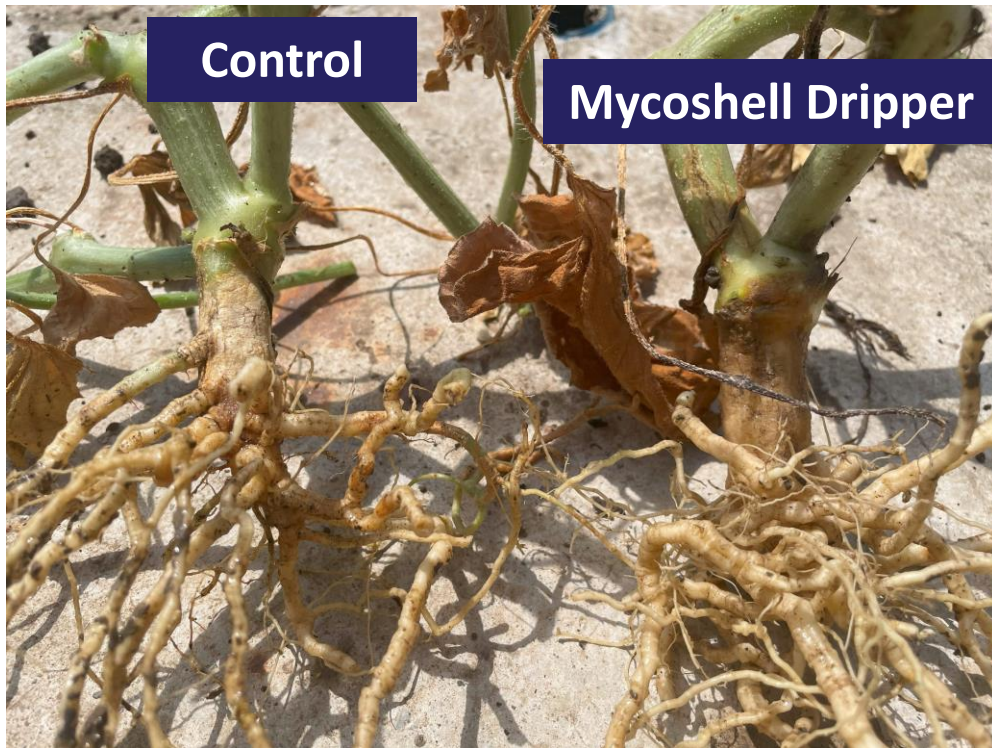
Technological solution based on microorganisms, accelerates seed and seedling development and guarantees stronger and healthier roots.

Mycoshell

Mycoshell
Dripper

Mycoshell
Tabs

Mycoshell
Tray



■ Microbial, biostimulant dry powder seed treatment

Composition:



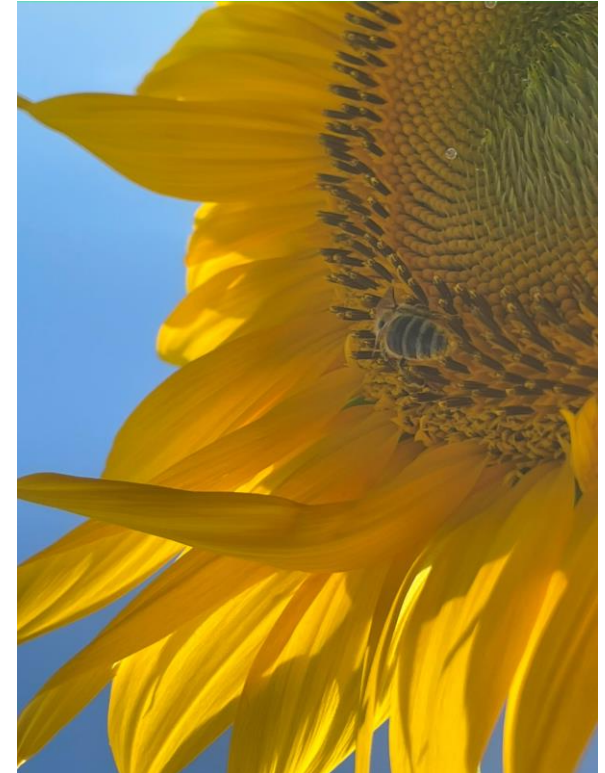
Mycorrhizas (*Rhizoglopus irregulares*)

**Selected rhizosphere bacteria
(*Azospirillum brasilense*; *Rhizobium*)**

Seaweed extract

Iron (Fe)

Manganese (Mn)



■ Three products focused on different crops:

Kiplant Awaken Sunflower

- AZOSPIRILLUM BRASILENSE
3x10e4ufc/g
- AZOSPIRILLUM LIPOFERUM
3x10e4ufc/g
- RHIZOGLOMUS IRREGULARES
825esporas/g
- Ascophyllum nodosum 11%
- Hierro 0,2%
- Manganeso 2%

Kiplant Awaken Corn

- AZOSPIRILLUM BRASILENSE
2,5x10e4ufc/g
- AZOSPIRILLUM LIPOFERUM
2,5x10e4ufc/g
- RHIZOGLOMUS IRREGULARES
1125esporas/g
- Ascophyllum nodosum 7,3%
- Hierro 0,2%
- Manganeso 2%

Kiplant Awaken Horticulture

- AZOSPIRILLUM SP.
5x10e4ufc/g
- RHIZOGLOMUS IRREGULARES
1200esporas/g
- Ascophyllum nodosum 8%
- Hierro 0,2%
- Manganeso 2,2%



Application rate:

| | |
|-----------|-------------------------|
| Onion | 250-300g/10kg de seeds |
| Sunflower | 200-220g/10kg de seeds |
| Pea | 180-220g/100kg de seeds |
| Corn | 200-250g/100kg de seeds |
| Soy | 280-320g/100kg de seeds |
| Carrot | 250-300g/10kg de seeds |



RESULTS IN CORN



Beled, Kalász Kft.



HortiGrow.eu
Agricultura Moderna Exitosa

László Kéki



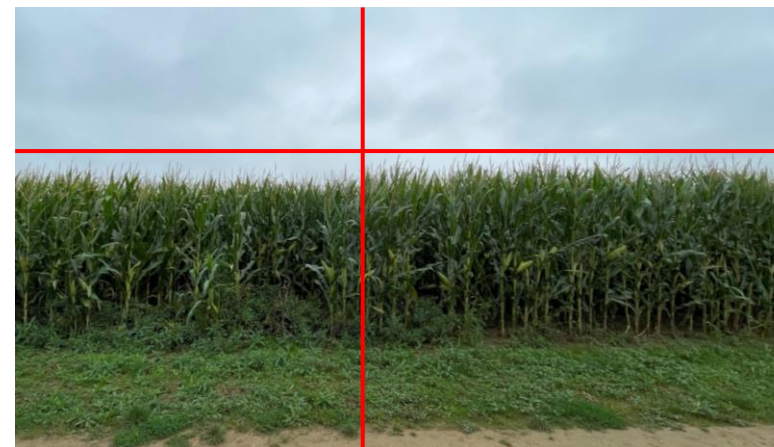
Kertcenter.com



asfertglobal[®]
A budding new agriculture

TRIAL CHARACTERISTICS

| | |
|------------------------------|---|
| Cultivation | Corn |
| Experimental design | Random block model |
| Location | Beled, Northwest region of Hungary |
| Plot area/ trial area | 1 ha |
| Treatments | 1. Control 2. Kiplant Awaken |
| Mode of application | Mix with the coated seeds |
| Type of soil | Clay brown forest soil (Arany-bonded number: 27) |



RESULTS IN CORN

| Soil sample Pécs National Laboratory, NÉBIH | 2023-04-24 | 2023-08-29 | 2023-08-29 |
|---|------------------|------------------|------------------|
| | Corn - untreated | Corn - untreated | Corn - treated |
| Total germs (pathogenes) | 3,66 * 10 az 5 n | 7,99 * 10 a 7 n | 1,58 * 10 a 7 n |
| Benefical funghi | 2,72 * 10 a 7 n | 2,5 * 10 az 5 n | 3,12 * 10 az 5 n |
| Number of N-fixing bacteria | 1,34 * 10 a 7 n | 2,81 * 10 a 7 n | 2,69 * 10 a 7 n |

RESULTS IN CORN

| Soil analysis Velence National Laboratory, NÉBIH | 2023-05-17 | 2023-08-30 | 2023-08-30 |
|---|--|--|--|
| | Corn – untreated (dry sample) | Corn – untreated (dry sample) | Corn – treated (dry sample) |
| Arany-bonded number (KA) | 49.3 | 46 | 51 |
| Phosphorus-pentoxid [AL] | 77,5 | 82,3 mg/kg | 103 mg/kg |
| S [KCI] | 8,20 mg/kg | 7,27 mg/kg | 7,76 mg/kg |
| Nitrite + Nitrate Nitrogen [KCI] | 23,86 mg/kg | 8,74 mg/kg | 12,8 mg/kg |

RESULTS IN CORN

| Leaf analysis Velenca National Laboratory, NÉBIH | 2023-08-30 | 2023-08-30 |
|--|------------------|----------------|
| | Corn - untreated | Corn – treated |
| Zn [HNO3/H2O2] | 40,5 mg/kg | 48,1 mg/kg |
| Mn [HNO3/H2O2] | 44,4 mg/kg | 88,2 mg/kg |
| Na [HNO3/H2O2] | 56,2 mg/kg | 59,7 mg/kg |
| Cu [HNO3/H2O2] | 13,8 mg/kg | 20,2 mg/kg |
| Fe [HNO3/H2O2] | 117 mg/kg | 292 mg/kg |
| Ca [HNO3/H2O2] | 0,589 %(m/m) | 0,683 %(m/m) |
| K [HNO3/H2O2] | 1,02 %(m/m) | 1,04 %(m/m) |
| Mg [HNO3/H2O2] | 0,226 %(m/m) | 0,27 %(m/m) |
| N [H2SO4/H2O2] | 2,12 %(m/m) | 2,13 %(m/m) |

RESULTS IN CORN



Beled, Kalász Kft.

YIELD IN CORN



18%

| Name | Area (production; ha) | Yield (t) | Average (t/ha) | Average contamination of water (%) | Total (t) | Average (t/ha) |
|-------------------------------|--------------------------|-----------|-------------------|--|-----------|-------------------|
| Place: Bélamajorral sz. | 20,1727 | 319,26 | 15,83 | 33,69% | 243,335 | 12,06 |
| Trial | 0,55 | 10,26 | 18,65 | 32,70% | 7,765 | 14,12 |

Beled, Kalász Kft.



asfertglobal®

A budding new agriculture

RESULTS IN PAPRIKA

Kiplant
Awaken



Control



asfertglobal[®]
A budding new agriculture

TRIAL CHARACTERISTICS

| | |
|------------------------------|--|
| Cultivation | Corn |
| Experimental design | Random block model |
| Location | Lakitelek, Center region of Hungary |
| Plot area/ trial area | 6 paprika varieties, 4 plot, 3 rows (1 row 3 m) |
| Treatments | 1. Control 2. Kiplant Awaken |
| Mode of application | Mix with the seeds |
| Type of soil | Sandy soil (Arany-bonded number: 27) |



RESULTS IN PAPRIKA

| Soil sample Pécs National Laboratory, NÉBIH | 2023-04-17 | 2023-08-28 | 2023-08-28 |
|---|------------------------|------------------------|----------------------|
| | Paprika - untreated | Paprika - untreated | Paprika - treated |
| Total germs (pathogenes) | 1,53 * 10 a 7 n | 7,65 * 10 a 6 n | 4,45 * 10 a 6 n |
| Benefical funghi | 1,32 * 10 az 5 n | 1,41 * 10 az 5 n | 4,16 * 10 a 4 n |
| Number of N-fixing bacteria | 6,61 * 10 a 6 n | 4,6 * 10 a 6 n | 3,67 * 10 a 6 n |

RESULTS IN PAPRIKA

| Soil analysis Velence National Laboratory, NÉBIH | 2023-05-25 | 2023-05-25 | 2023-05-25 |
|--|-------------------------|------------------------|---------------------|
| | Paprika (untreated) | Paprika (untreated) | Paprika (treated) |
| Humus [K ₂ Cr ₂ O ₇ /H ₂ SO ₄] | 0,51 (m/m) dry soil | 0,644 %(m/m) | 0,705 %(m/m) |
| S [KCl] | 6,48 mg/kg dry soil | 2 mg/kg | 2,42 mg/kg |
| Mg [KCl] | 61,3 mg/kg dry soil | 43,5 mg/kg | 47,7 mg/kg |
| Mn [EDTA] | 48,06 mg/kg dry soil | 48,7 mg/kg | 50,8 mg/kg |
| Cu [EDTA] | 2,36 mg/kg dry soil | 2,35 mg/kg | 4,14 mg/kg |
| pH (KCl 1:2,5) | 5,29 dry soil | 5,72 | 6,14 |

RESULTS IN PAPRIKA

| Leaf analysis Velence National Laboratory, NÉBIH | 2023-09-18 | 2023-09-18 |
|---|------------------------|--------------------|
| | Paprika (untreated) | Paprika (treated) |
| Br [HNO3/H2O2] | 83,7 mg/kg | 89,9 mg/kg |
| Zn [HNO3/H2O2] | 32,1 mg/kg | 32,8 mg/kg |
| Mo [HNO3/H2O2] | 0,281 mg/kg | 0,337 mg/kg |
| Fe [HNO3/H2O2] | 71,3 mg/kg | 85,5 mg/kg |
| K [HNO3/H2O2] | 2,36 %(m/m) | 2,66 %(m/m) |

Lakitelek, Univer Kft.

RESULTS IN PAPRIKA



RESULTS IN SUNFLOWER



Beled, Kalász Kft.



asfertglobal[®]
A budding new agriculture

TRIAL CHARACTERISTICS

| | |
|------------------------------|---|
| Cultivation | Sunflower |
| Experimental design | Random block model |
| Location | Beled, Northwest region of Hungary |
| Plot area/ trial area | 1 ha |
| Treatments | 1. Control 2. Kiplant Awaken |
| Mode of application | Mix with the coated seeds |
| Type of soil | Clay brown forest soil (Arany-bonded number: 27) |

Kiplant
Awaken



Kiplant
Awaken

Control



RESULTS IN SUNFLOWER

| Soil sample Pécs National Laboratory, NÉBIH | 2023-04-24 | 2023-08-29 | 2023-08-29 |
|--|----------------------------------|----------------------------------|--------------------------------|
| | Sunflower - untreated | Sunflower - untreated | Sunflower - treated |
| Total germs (pathogenes) | 1,66 * 10 az 7 n | 1,69 * 10 a 8 n | 1,33 * 10 a 7 n |
| Benefical funghi | 2,18 *10 az 5 n | 3,58 * 10 az 5 n | 3,03 * 10 az 5 n |
| Number of N-fixing bacteria | 2,8 *10 az 7 n | 3,40 * 10 a 7 n | 6,40 * 10 a 7 n |

RESULTS IN SUNFLOWER

| Soil analysis Velence National Laboratory, NÉBIH | 2023-05-17 | 2023-08-30 | 2023-08-30 |
|--|---------------------------------------|------------------------------------|----------------------------------|
| | Sunflower (untreated, dry soil) | Sunflower (untreated, dry soil) | Sunflower (treated, dry soil) |
| Zn [EDTA] | 1,8 mg/kg | 3,01 mg/kg | 3,28 mg/kg |
| Phosphorus-pentoxid [AL] | 90,3 | 127 mg/kg | 220 mg/kg |
| Potassium-oxide [AL] | 172,7 mg/kg | 196 mg/kg | 212 mg/kg |
| S [KCl] | 5,26 mg/kg | 3,66 mg/kg | 6 mg/kg |
| Mg [KCl] | 377 mg/kg | 345 mg/kg | 401 mg/kg |
| Mn [EDTA] | 189,6 mg/kg | 262 mg/kg | 264 mg/kg |
| Nitrite + Nitrate Nitrogen [KCl] | 16,2 mg/kg | 3,34 mg/kg | 7,49 mg/kg |
| Cu [EDTA] | 3,64 mg/kg | 4,57 mg/kg | 5,07 mg/kg |
| pH (KCl 1:2,5) | 5,26 | 5,45 | 5,51 |

RESULTS IN SUNFLOWER

| Leaf analysis Velence National Laboratory, NÉBIH | 2023-08-30 | 2023-08-30 |
|---|------------------------------|----------------------------|
| | Sunflower (untreated) | Sunflower (treated) |
| Br [HNO3/H2O2] | 120 mg/kg | 130 mg/kg |
| Na [HNO3/H2O2] | 47,8 mg/kg | 49,2 mg/kg |
| Fe [HNO3/H2O2] | 57,7 mg/kg | 62,2 mg/kg |
| P [HNO3/H2O2] | 0,313 %(m/m) | 0,332 %(m/m) |
| Ca [HNO3/H2O2] | 3,29 %(m/m) | 4,1 %(m/m) |
| Mg [HNO3/H2O2] | 0,98 %(m/m) | 1,2 %(m/m) |

RESULTS IN SUNFLOWER



D=26 cm

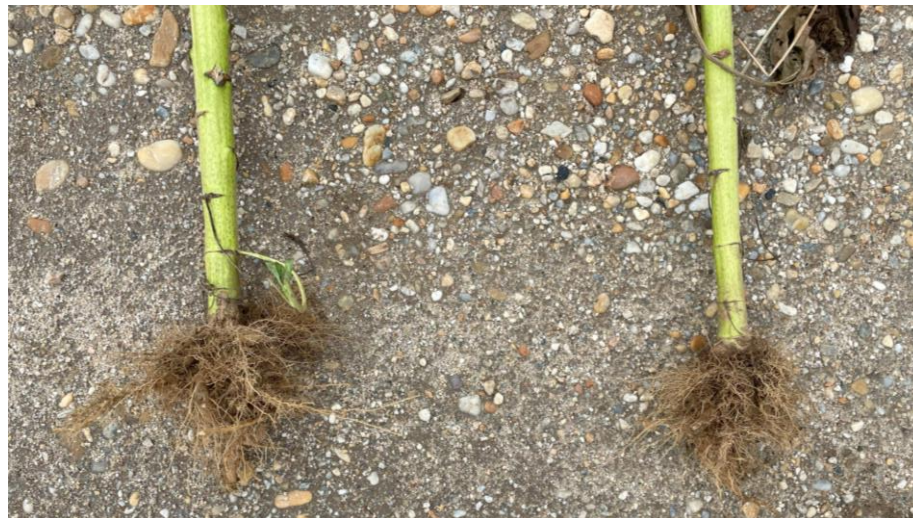


D=22 cm

Control

Kiplant
Awaken

Beled, Kalász Kft.



asfertglobal[®]
A budding new agriculture

YIELDS IN SUNFLOWER



19%

| Name | Area (production; ha) | Yield (t) | Average (t/ha) |
|---------------|-----------------------|-----------|----------------|
| Józsefmajor 2 | 63,1800 | 151,6900 | 2,40 |
| Trial | 1 | 2,855 | 2,855 |



CONCLUSIONS



asfertglobal[®]
A budding new agriculture

Kiplant **Awaken**

NEW!

Kiplant
Awaken

Untreated

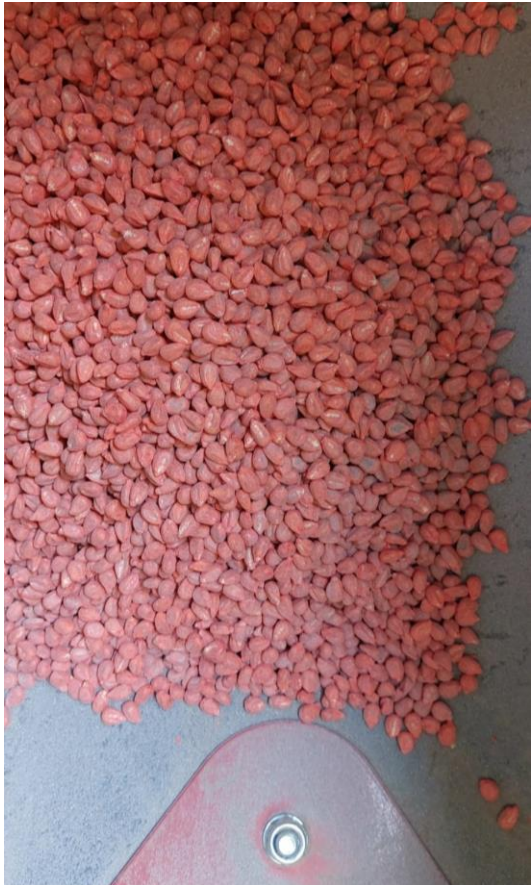


Kiplant
Awaken

Untreated



CONCLUSIONS



asfertglobal®
A budding new agriculture

CONCLUSIONS



FURTHER RESULTS

1. **Waiting for: yields**
2. **Further open field researches next season in more countries**
3. **Focus on product development**



CONCLUSIONS

Basically, the soil type and crop also determine the effectiveness of the product.

1. Improve the germination and generative growth of the plant
2. Stimulates the plant: more nutrition and water uptake
3. Helps to improve the plants' immune system
4. Increases microbiome and soil health



Mycoshell

Kiplant
Awaken



asfertglobal[®]

A budding new agriculture



asfertglobal

innovation in plant sciences

Thank You so much for your attention!