

## "List of existing/operating installations converting secondary raw materials into fertilising products"

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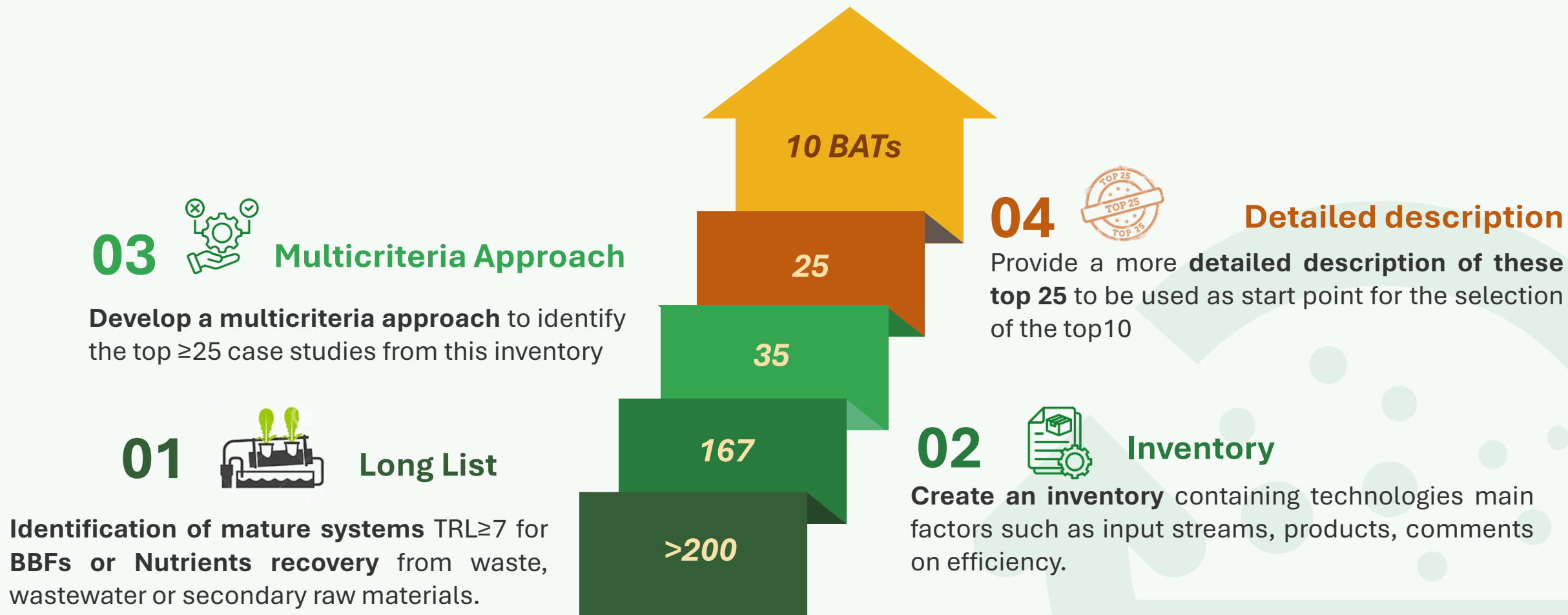
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### Platforms and Data Bases



### European Projects



### Partners portfolio

- ✓ EBA
- ✓ ECN
- ✓ CARTIF
- ✓ BTG
- ✓ PWR
- ✓ UNITO
- ✓ NTUA



In total, 167 technologies were described in a deliverable

### The technologies description includes:

- The technology category
- The PFC of the 1<sup>st</sup>, and if there are more, of the 2<sup>nd</sup> product
- Name of the product
- Name of technology and projects
- CMC of the 1<sup>st</sup> and if there is, of the 2<sup>nd</sup> fertilizer
- Description of the feedstock used
- Technology Readiness Level
- Application tests, if any



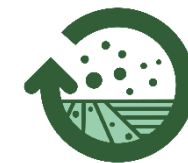
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| 1  | A                       | B                                   | C                   | D        | E        | F                                                                                                                                                                       | G                                                          | H      | I      | J                                                                                                                                                                                                                                                                | K                                                                                                                                                                                                                                                                                                                                                                                       | L  | M                                                                           | N                                                                                                                                                                                                                                                                                                                 |
|----|-------------------------|-------------------------------------|---------------------|----------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | 1st Ref No<br>Word text | Meets Crit                          | Technology Cate     | PFC      | PFC      | Products                                                                                                                                                                | Technology/Proj                                            | CMC    | CMC    | Feedstock descriptio                                                                                                                                                                                                                                             | Description of technology                                                                                                                                                                                                                                                                                                                                                               | TR | Application tests                                                           | References                                                                                                                                                                                                                                                                                                        |
| 1  | 1                       | <input checked="" type="checkbox"/> | adsorption          | PFC 1(C) |          | ammonium sulphate, ammonium nitrate                                                                                                                                     | WaiNUT (Urban wastewater treatment pilot system)           | CMC 15 |        | urban wastewater                                                                                                                                                                                                                                                 | High-Rate Activated Sludge (HRAS), Zeolite-Based Adsorption                                                                                                                                                                                                                                                                                                                             | 6  | In fields and pots                                                          | <a href="https://wainutproject.eu/news/operations-start-at-the-bd-gum-based-wai-nut-pilot-plant/">https://wainutproject.eu/news/operations-start-at-the-bd-gum-based-wai-nut-pilot-plant/</a>                                                                                                                     |
| 2  | 2                       | <input checked="" type="checkbox"/> | adsorption          | PFC 3    | PFC 6    | soil improver and microbial plant biostimulant                                                                                                                          | WaiNUT (Food industrial wastewater treatment pilot system) | CMC 11 |        | Dairy and cheese dairy (acid whey)                                                                                                                                                                                                                               | liquid fermentation, solid fermentation, ABC thermal processing, ABC adsorption                                                                                                                                                                                                                                                                                                         | 7  | In fields and pots                                                          | <a href="https://wainutproject.eu/news/food-processing-waste-management-in-dairy-industry-the-bd-gum-plant/">https://wainutproject.eu/news/food-processing-waste-management-in-dairy-industry-the-bd-gum-plant/</a>                                                                                               |
| 3  | 3                       | <input checked="" type="checkbox"/> | adsorption          | PFC 1(C) |          | Phosphates                                                                                                                                                              | Water Mining (Lemosa WWTP)                                 | CMC 15 |        | treated wastewater                                                                                                                                                                                                                                               | adsorption columns                                                                                                                                                                                                                                                                                                                                                                      | 7  | no application                                                              | <a href="https://watermining.eu/en/about-us">https://watermining.eu/en/about-us</a>                                                                                                                                                                                                                               |
| 4  | 4                       | <input checked="" type="checkbox"/> | adsorption          |          |          | Clean biogas, H <sub>2</sub> S-free, suitable for energy generation (CHP, biomethane) without corrosion risks, Sulfur-enriched digestate, Contains FeS and S, enhancing | Biogas desulphurization                                    |        |        | Municipal solid waste, Energy crops (e.g. maize, sunflower, sugar beet), Livestock manure, Sewage sludge from wastewater treatment plants                                                                                                                        | Direct Digester Addition: FemoBio powder is dosed directly into the anaerobic digester. Reaction: Iron hydroxide reacts with H <sub>2</sub> S to form iron sulfide (FeS) and elemental sulfur (S), which settle in the digester. Adsorption (Optional) FemoBio pellets are used in filters for post-digestion H <sub>2</sub> S removal                                                  | 9  |                                                                             | <a href="https://femobio-group.com/femo-bio/">https://femobio-group.com/femo-bio/</a>                                                                                                                                                                                                                             |
| 5  | 6                       | <input checked="" type="checkbox"/> | adsorption          | PFC 1(C) |          | Phosphates                                                                                                                                                              | P-BioAMOF                                                  | CMC 15 |        | Agricultural wastewater: Contaminated with phosphate fertilizers and organophosphorus pesticides, Low-value mineral wastes: Sources of zirconium for metal-organic frameworks (MOF) synthesis                                                                    | zirconium-based metal-organic frameworks synthesized in microwaves                                                                                                                                                                                                                                                                                                                      | 5  |                                                                             | <a href="https://cordis.europa.eu/article/id/443115-absorbing-phosphate-fertilizers-from-agriculture-wastewater">https://cordis.europa.eu/article/id/443115-absorbing-phosphate-fertilizers-from-agriculture-wastewater</a>                                                                                       |
| 6  | 8                       | <input checked="" type="checkbox"/> | anaerobic digestion | PFC 1(C) |          | Ammonium sulphate solution, Treated digestate with significantly reduced nitrogen content                                                                               | BTS Biogas Stripping NITRO Strip                           | CMC 5  |        |                                                                                                                                                                                                                                                                  | Anaerobic digestion (AnMBR), implementation of a BTS Biogas stripping system for the reduction of nitrogen level in the digestate up to 60%-70%. The stripping system uses a chemical process involving a scrubber with acidic wash to remove ammonia from the digestate, and allows the production of ammonium sulfate                                                                 | 9  | company's fields and sold in fertilizer companies                           | <a href="https://www.uroboros.com/en/bts-biogas-stripping-system-is-able-to-remove-up-to-70-of-the-nitrogen-content-in-the-digestate-produced-by-digesters">https://www.uroboros.com/en/bts-biogas-stripping-system-is-able-to-remove-up-to-70-of-the-nitrogen-content-in-the-digestate-produced-by-digesters</a> |
| 7  | 7                       | <input checked="" type="checkbox"/> | anaerobic digestion | PFC 1(C) |          | Ammonium sulfate, struvite, phosphoric acid, ammonium nitrate                                                                                                           | RUN4LIFE                                                   | CMC 2  | CMC 15 | household waste and wastewater                                                                                                                                                                                                                                   | Combination of existing wastewater treatment technologies with hyperthermophilic anaerobic digestion, and bio-electrochemical systems                                                                                                                                                                                                                                                   | 7  | extended field trials                                                       | <a href="https://run4life-project.eu/en/it/eng/">https://run4life-project.eu/en/it/eng/</a>                                                                                                                                                                                                                       |
| 8  | 8                       | <input checked="" type="checkbox"/> | anaerobic digestion | PFC 1(B) |          | dry, nutrient rich, concentrated organic fertilizer with high NPK                                                                                                       | Pavilion Biogas                                            | CMC 10 |        | Not stable: carbon rich agricultural and food waste which would otherwise go to landfill e.g Cattle paunch, fruit and vegetable waste, cheese whey or a combination of all                                                                                       | Anaerobic digestion, biogas production for heat and energy production                                                                                                                                                                                                                                                                                                                   | 8  | fertilizer supplied in the region                                           | <a href="https://pavilionbiogas.com/">https://pavilionbiogas.com/</a>                                                                                                                                                                                                                                             |
| 9  | 9                       | <input checked="" type="checkbox"/> | anaerobic digestion | PFC 1(A) | PFC 3    | Solid and liquid fractions used as organic fertilizer and soil conditioner                                                                                              | ProCyclo                                                   | CMC 5  |        | Livestock manure (e.g., cow, pig, poultry), Agricultural residues (crop waste, silage), Organic industrial and municipal waste (where available)                                                                                                                 | 1. This waste is mixed and placed in a biogas digester or reactor (a closed container or tank in which organic matter is decomposed), where pumping systems facilitate the movement of fluids. 2. The organic matter is removed and heated to high temperatures to enable the biogas formation process. It remains inside for several weeks before being transformed into a more stable | 9  |                                                                             | <a href="https://procycle.com/en/biogas-reactors-installation">Biogas digester or biogas reactors installation</a>                                                                                                                                                                                                |
| 10 | 10                      | <input checked="" type="checkbox"/> | anaerobic digestion | PFC 3    | PFC 1(A) | High-quality compost, peat-free potting soil                                                                                                                            | RETERRA (LUNEN)                                            | CMC 3  |        | Organic waste from municipal collection (household organic bins) Biogenic waste from small businesses in the Banim and Miskisch-Oberland districts (and similar regions) Typical feedstocks include food scraps, garden waste, and other biodegradable materials | Anaerobic Digestion: Organic waste is first processed in digesters, to produce biogas, Co-Digestion: The digested residue is then transferred to tunnel composting units, where aerobic decomposition produces high-quality compost and peat-free potting soil.                                                                                                                         | 9  |                                                                             | Potting                                                                                                                                                                                                                                                                                                           |
| 11 | 11                      | <input checked="" type="checkbox"/> | anaerobic digestion | PFC 1(A) | PFC 1(C) | Liquid digestate (essentially NH <sub>4</sub> ), solid digestate                                                                                                        | Evergetz                                                   | CMC 5  |        | Food industry by-products, Agricultural residues and livestock manure, Municipal biowaste and green waste, Industrial organic waste                                                                                                                              | Anaerobic digestion                                                                                                                                                                                                                                                                                                                                                                     | 9  | applied as a natural fertilizer on partner farms, closing the nutrient loop | <a href="https://evergetz.com/en/peat-free-production/">https://evergetz.com/en/peat-free-production/</a>                                                                                                                                                                                                         |
| 12 |                         |                                     |                     |          |          |                                                                                                                                                                         |                                                            |        |        | Livestock manure and slurry from dairy                                                                                                                                                                                                                           | Manure and slurry are collected and pre-treated to optimize nutrient                                                                                                                                                                                                                                                                                                                    |    |                                                                             |                                                                                                                                                                                                                                                                                                                   |

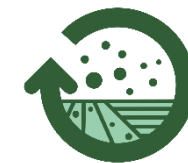


# Long list of technologies (numbers 1-60)



- |    |                                                                        |    |                                                                              |
|----|------------------------------------------------------------------------|----|------------------------------------------------------------------------------|
| 1  | <u>Walnut – Pilot system II: Urban wastewater treatment</u>            | 31 | <u>BIOSTRATEG II (Goldenrod)</u>                                             |
| 2  | <u>Walnut - Pilot System III: Food industrial wastewater treatment</u> | 32 | <u>BIOSTRATEG II (Alfalfa)</u>                                               |
| 3  | <u>Water Mining - Pilot System II (Larnaca WWTP – CS4)</u>             | 33 | <u>FERTIMANURE - Spanish Pilot</u>                                           |
| 4  | <u>Biogas desulphurization</u>                                         | 34 | <u>KUBOTA</u>                                                                |
| 5  | <u>PSust-MOF</u>                                                       | 35 | <u>PAKU</u>                                                                  |
| 6  | <u>BTS Biogas Srl/GmbH NITROStrip</u>                                  | 36 | <u>Kompostwerk Lobau (Austria)</u>                                           |
| 7  | <u>RUN4LIFE</u>                                                        | 37 | <u>Abfallwirtschaft Neckar-Odenwald-Kreis (Germany) – compost production</u> |
| 8  | <u>Pavillion Biogas</u>                                                | 38 | <u>SFP (Sustainable fuel Plant) Zeeland B.V.</u>                             |
| 9  | <u>ProCycla</u>                                                        | 39 | <u>LIPOR (Portugal)</u>                                                      |
| 10 | <u>RETERRA (LUNEN)</u>                                                 | 40 | <u>RETERRA</u>                                                               |
| 11 | <u>Evergaz</u>                                                         | 41 | <u>NENUPHAR – Lielupe River Basin</u>                                        |
| 12 | <u>LIFE DOP</u>                                                        | 42 | <u>SEA2LAND – Adriatic Sea pilot</u>                                         |
| 13 | <u>Nutri2Cycle</u>                                                     | 43 | <u>SEA2LAND project - North Sea Pilot</u>                                    |
| 14 | <u>Systemic project (Yeper, Belgium- Waterleau New Energy/WNE)</u>     | 44 | <u>SEA2LAND - Baltic Sea pilot</u>                                           |
| 15 | <u>Systemic project (Ottersberg (Germany), BENAS)</u>                  | 45 | <u>LIFE Enrich</u>                                                           |
| 16 | <u>Systemic project (Acqua &amp; Sole Vellezzo Bellini (IT))</u>       | 46 | <u>Water-Mining – Pilot System III (La Llagosta Spain (CS5))</u>             |
| 17 | <u>SUEZ - Anaerobic Digestion</u>                                      | 47 | <u>Pearl® process</u>                                                        |
| 18 | <u>DigestMix® System</u>                                               | 48 | <u>NuReSys</u>                                                               |
| 19 | <u>LIFE VALUVOIL</u>                                                   | 49 | <u>Phospaq®</u>                                                              |
| 20 | <u>LIFE REVAWASTE</u>                                                  | 50 | <u>The Struvia™</u>                                                          |
| 21 | <u>SYNECO</u>                                                          | 51 | <u>LIFE PHORWater</u>                                                        |
| 22 | <u>OrganiQ</u>                                                         | 52 | <u>STUTTGART</u>                                                             |
| 23 | <u>Ecoson</u>                                                          | 53 | <u>Crystalactor®</u>                                                         |
| 24 | <u>Revis Bioenergy</u>                                                 | 54 | <u>Waterleau New Energy</u>                                                  |
| 25 | <u>LIDER project (cereals)</u>                                         | 55 | <u>Varcor</u>                                                                |
| 26 | <u>LIDER project (vegetables)</u>                                      | 56 | <u>Systemic project (Am-Power/ Pittem, Flanders, BE)</u>                     |
| 27 | <u>Development project (mushroom)</u>                                  | 57 | <u>Green2X</u>                                                               |
| 28 | <u>Development project (spirulina)</u>                                 | 58 | <u>Treat2ReUse</u>                                                           |
| 29 | <u>SONATA BIS (currant seeds)</u>                                      | 59 | <u>ReJuice</u>                                                               |
| 30 | <u>SONATA BIS (raspberry seeds)</u>                                    | 60 | <u>Era-Net (liquid fertilizer)</u>                                           |

# Long list of technologies (numbers 61-120)



|           |                                                                               |            |                                                                              |
|-----------|-------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------|
| <u>61</u> | <u>Era-Net (solid fertilizer)</u>                                             | <u>91</u>  | <u>Aqua2N technology from LIFE RE-Fertilize project</u>                      |
| <u>62</u> | <u>POIG</u>                                                                   | <u>92</u>  | <u>LEACHPHOS</u>                                                             |
| <u>63</u> | <u>POIG and NCBR</u>                                                          | <u>93</u>  | <u>Seaborne process</u>                                                      |
| <u>64</u> | <u>POIG and NCBR</u>                                                          | <u>94</u>  | <u>WALNUT – Pilot System IV: Brine wastewater treatment pilot system</u>     |
| <u>65</u> | <u>POIG and NCBR</u>                                                          | <u>95</u>  | <u>PHOSPHIX</u>                                                              |
| <u>66</u> | <u>Re-NEW</u>                                                                 | <u>96</u>  | <u>NUTREC</u>                                                                |
| <u>67</u> | <u>Unlock</u>                                                                 | <u>97</u>  | <u>EasyMining – Ash2Phos technology</u>                                      |
| <u>68</u> | <u>Anuvia</u>                                                                 | <u>98</u>  | <u>Rubiphos</u>                                                              |
| <u>69</u> | <u>LYSTEC technology</u>                                                      | <u>99</u>  | <u>Ash2salt</u>                                                              |
| <u>70</u> | <u>SEA2LAND - Cantabric Sea Pilot</u>                                         | <u>100</u> | <u>REM-NUT technology</u>                                                    |
| <u>71</u> | <u>SEA2LAND - Atlantic Sea pilot</u>                                          | <u>101</u> | <u>REFLOW</u>                                                                |
| <u>72</u> | <u>Sludge lysis (THP)</u>                                                     | <u>102</u> | <u>WasStrip</u>                                                              |
| <u>73</u> | <u>Agua DB Technology</u>                                                     | <u>103</u> | <u>Airprex process</u>                                                       |
| <u>74</u> | <u>Smart Plant - IEX</u>                                                      | <u>104</u> | <u>Susfert</u>                                                               |
| <u>75</u> | <u>FERRO</u>                                                                  | <u>105</u> | <u>Ecophos</u>                                                               |
| <u>76</u> | <u>NENUPHAR - Danube River Basin demo - Slovakia</u>                          | <u>106</u> | <u>SMART PLANT - SCEPPHAR</u>                                                |
| <u>77</u> | <u>Rustica - Mineral Nutrient Concentrates</u>                                | <u>107</u> | <u>AMFER®</u>                                                                |
| <u>78</u> | <u>WATERAGRI</u>                                                              | <u>108</u> | <u>Ravita</u>                                                                |
| <u>79</u> | <u>Fertibox technology</u>                                                    | <u>109</u> | <u>Waterschap Velt en Vecht</u>                                              |
| <u>80</u> | <u>Sychem</u>                                                                 | <u>110</u> | <u>NewFert</u>                                                               |
| <u>81</u> | <u>Green Power (Guilliams Group)</u>                                          | <u>111</u> | <u>Abfallwirtschaft Neckar-Odenwald-Kreis (Germany) – biochar production</u> |
| <u>82</u> | <u>ELLIPSE</u>                                                                | <u>112</u> | <u>Rustica - Biochar</u>                                                     |
| <u>83</u> | <u>NINFA - Pilot system II: Terrassa, Barcelona, Spain</u>                    | <u>113</u> | <u>AWM (Munster)</u>                                                         |
| <u>84</u> | <u>Systemic project (Dutch pilot system- Groot Zevert Vergisting (GZV))</u>   | <u>114</u> | <u>AgroAmerica</u>                                                           |
| <u>85</u> | <u>REALM</u>                                                                  | <u>115</u> | <u>CarbonFX™</u>                                                             |
| <u>86</u> | <u>SABANA (Sustainable Algae Biorefinery for Agriculture aNd Aquaculture)</u> | <u>116</u> | <u>NENUPHAR - Ebro River Basin demo</u>                                      |
| <u>87</u> | <u>Walnut – Pilot System I: Hybrid microalgal cultivation system</u>          | <u>117</u> | <u>Detricon (from LIFE Infusion)</u>                                         |
| <u>88</u> | <u>LIFE ALGAECAN®</u>                                                         | <u>118</u> | <u>H2-VOLAZ</u>                                                              |
| <u>89</u> | <u>EXTRAALGAE, NCBR</u>                                                       | <u>119</u> | <u>Biogas Bree</u>                                                           |
| <u>90</u> | <u>NENUPHAR - Danube River Basin demo - Hungary</u>                           | <u>120</u> | <u>Fertimanure - Belgian Pilot</u>                                           |



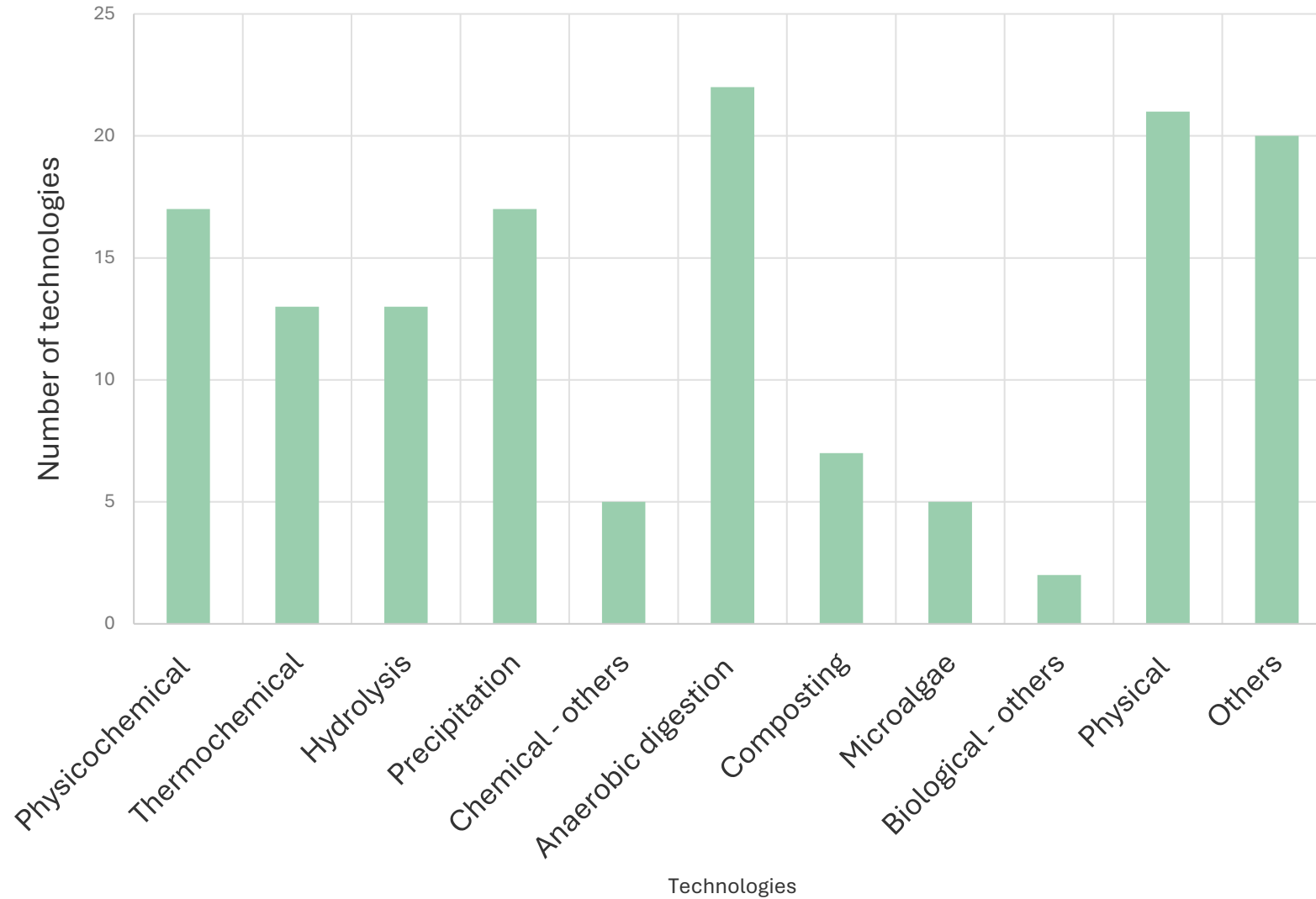
## Long list of technologies (121-167)

- |                                                                                   |                                   |
|-----------------------------------------------------------------------------------|-----------------------------------|
| <u>121 Fertimanure - French pilot</u>                                             | <u>151 NOMAD</u>                  |
| <u>122 Fertimanure - Dutch Pilot</u>                                              | <u>152 ReNu2Cycle</u>             |
| <u>123 NINFA - Pilot system I: Los Alcazares, Murcia, Spain</u>                   | <u>153 CAFÉ</u>                   |
| <u>124 LIFE MIX FERTILIZER</u>                                                    | <u>154 Yarasuna</u>               |
| <u>125 FERTIMANURE - German pilot system</u>                                      | <u>155 Steen FOS</u>              |
| <u>126 SEA2LAND - Mediterranean Sea Pilot (Malta)</u>                             | <u>156 OMEX BioHumate</u>         |
| <u>127 AshDec technology</u>                                                      | <u>157 Organomex 6 2 4</u>        |
| <u>128 Mephrec</u>                                                                | <u>158 BFerst</u>                 |
| <u>129 Spodofos</u>                                                               | <u>159 Biomex Plus</u>            |
| <u>130 RECaPHOS</u>                                                               | <u>160 NSAFE</u>                  |
| <u>131 RecoPhos</u>                                                               | <u>161 InnoProtein</u>            |
| <u>132 TerraNova</u>                                                              | <u>162 CHEERS</u>                 |
| <u>133 PASCH®</u>                                                                 | <u>163 Microalgae 4.0</u>         |
| <u>134 ReLEAF (Spanish pilot system)</u>                                          | <u>164 P2Green</u>                |
| <u>135 Rustica – Microbial biomass</u>                                            | <u>165 TANGO – FORMULATION F3</u> |
| <u>136 Rustica - Insect Biomass</u>                                               | <u>166 Sinfert</u>                |
| <u>137 Rustica - Insect Frass</u>                                                 | <u>167 Gas Loop project</u>       |
| <u>138 Rustica - Insect Chitin</u>                                                |                                   |
| <u>139 FlashPhos</u>                                                              |                                   |
| <u>140 OXYCON</u>                                                                 |                                   |
| <u>141 Wrote (BEF)</u>                                                            |                                   |
| <u>142 CIRCALGAE</u>                                                              |                                   |
| <u>143 Solubilization technology for poultry waste</u>                            |                                   |
| <u>144 TANGO - FORMULATION F5</u>                                                 |                                   |
| <u>145 Walnut – Pilot System IV: Urban wastewater and sewage sludge treatment</u> |                                   |
| <u>146 Water Mining – Pilot System I (Faro/Portugal – CS3)</u>                    |                                   |
| <u>147 Water2Return</u>                                                           |                                   |
| <u>148 ViviMag</u>                                                                |                                   |
| <u>149 N2Applied</u>                                                              |                                   |
| <u>150 BioRevolution</u>                                                          |                                   |

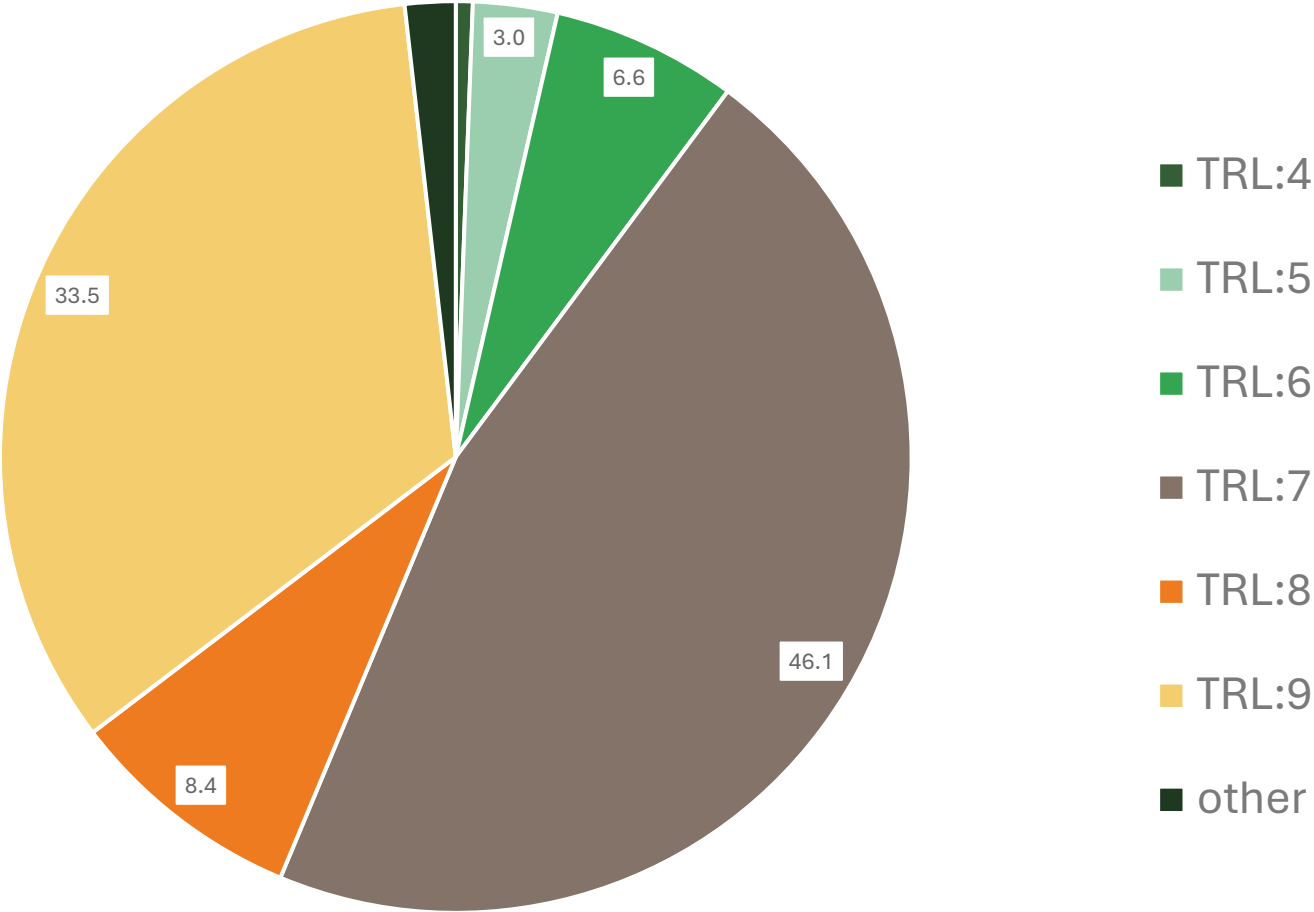




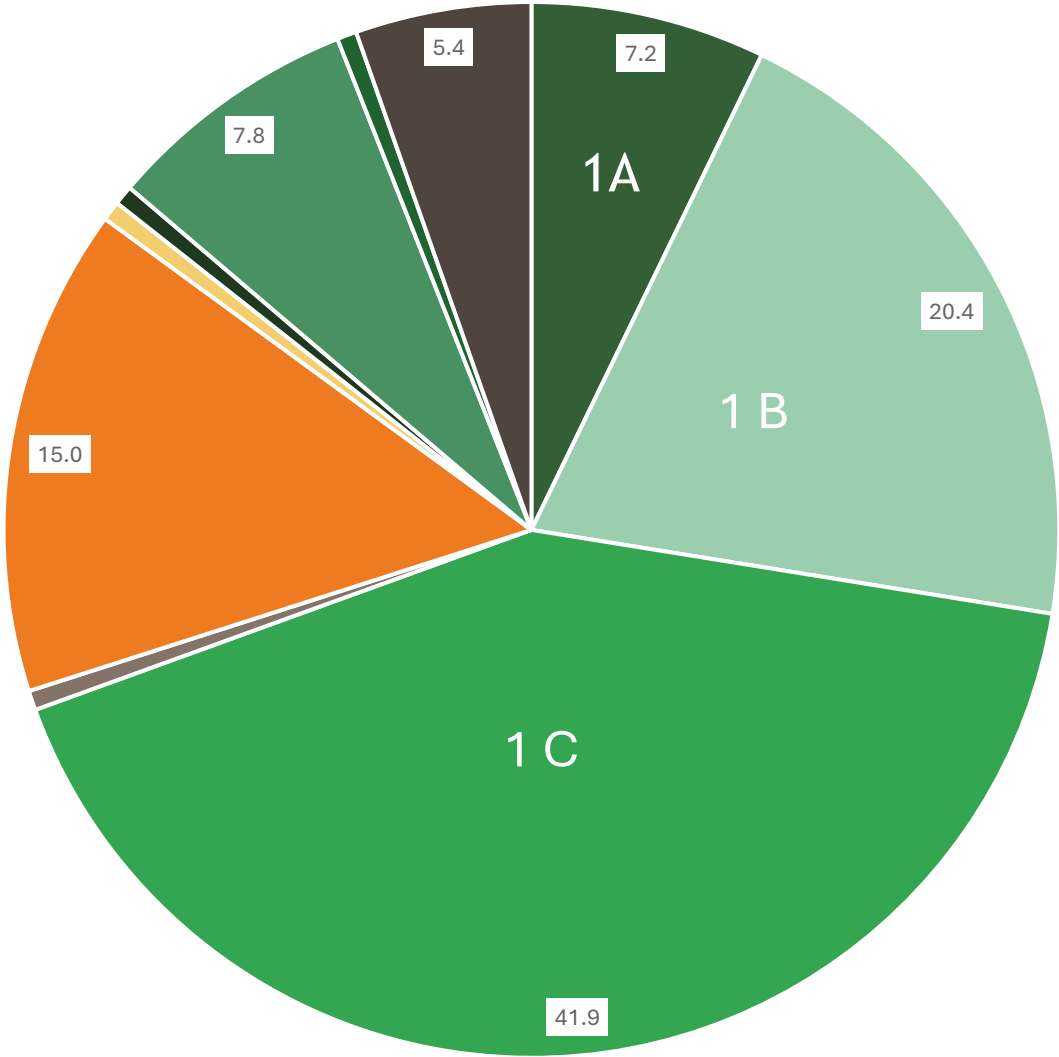
## Categories of the technologies



# Categorization of technologies based on their TRL



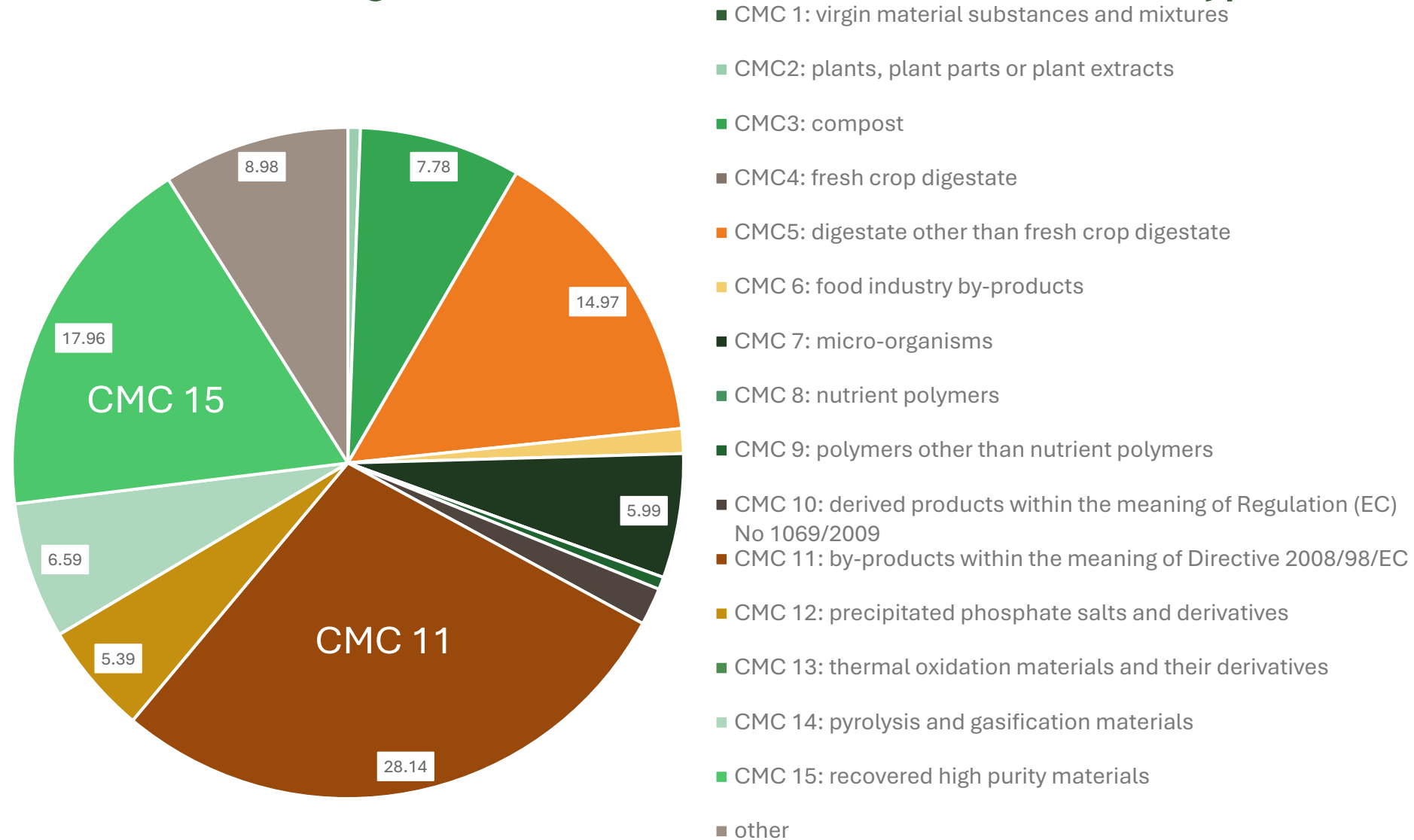
# Categorization of fertilizers based on their PFC type



- PFC 1(A):organic fertilizer
- PFC 1(B): organo-mineral fertilizer
- PFC 1 (C): inorganic fertilizer
- PFC 2: liming material
- PFC 3: soil improver
- PFC 4: growing medium
- PFC 5: inhibitor
- PFC 6: plant biostimulant
- PFC 7: fertilizing product blends
- other



## Categorization of fertilizers based on their CMC type





## Thank you for your attention

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