In this talk I will present the most simplest scenarios in which metric and metric-affine theories of gravity with curvature-matter couplings yield a MONDian (MOdified Newtonian Dynamics) non-relativistic limit. All these proposals satisfy the Tully-Fisher law and are also in agreement with bending of light associated to individual, groups and clusters of galaxies. The majority of the models require the introduction of a non-local Lagrangian, but local models can also be constructed. I will also show theoretical advantages between them and will present the best candidate according to SNIa cosmology observations.