Films of LiMn2O4 prepared by pulsed laser ablation deposition are typically lithium deficient when grown at background pressures ranging between 10^{-4} and 20 Pa. The deficiency of light atomic species such as lithium in LiMn2O4 thin films occurs as a result of the different behavior of the species during plume expansion and the deposition of the film at elevated deposition temperatures. The plasma plume evolution in vacuum and 20 Pa oxygen pressure are studied using two spectroscopic techniques: emission spectroscopy and plume imaging. Higher velocities and a wider spatial distribution of lithium atoms are observed in vacuum when compared with manganese and oxygen species. Plume species are slowed down due to collisions with gas molecules when ablating LiMn2O4 in an oxygen atmosphere. As a result, a strong deceleration of the plasma front occurs, and the effect is more pronounced for the light species, e.g., Li. Comparing the spatial manganese and lithium distribution within the plasma, the lithium species are again scattered into a wider angular range. These similar spatial distributions of Li atoms detected in the pressure range between 10^{-4} and 20 Pa suggest that it is not possible to achieve a congruent lithium transfer to a growing film if the target contains heavier elements besides lithium. The general implications for the ablation of materials containing a combination of light and heavy elements are that as-grown films are inherently deficient with respect to the content of the light elements. If the mass ratio between the light and the heavy elements is not too different, is should be possible to find a set of deposition parameters which will result in the growth of a film with the desired composition.