GLPK Case Study 1 - 60016 Operations Research

The case study teaches how to use GLPK to solve a basic resource allocation problem inspired to a realistic situation and explains how to read the glpsol output files. Consider a company producing three brands of fertilisers:

SulphurGrower	(S)
EssarGrower	(E)
NitroGrower	(N).

The raw materials required to produce each of these are:

SulphurGrower	EssarGrower	NitroGrower
15% Sulphur	10% Sulphur	5% Sulphur
5% Nitrate	10% Nitrate	10% Nitrate
10% Potash	10% Potash	15% Potash

During any given period the company can obtain up to 1000 kg of Sulphur, 1600 kg Nitrate, and 2500 kg Potash. During the same period the company has contracts to supply at least 1000 kg of SulphurGrower (S), and 500 kg of EssarGrower (E). There is no upper limit on the volumes of fertilisers that the company can sell. The profits for each fertiliser are:

SulphurGrower	£3/kg
EssarGrower	£5/kg
NitroGrower	£5/kg

1. Write the LP for maximising the profit.
2. Using GMPL, write a corresponding LP model for GLPK.
3. Using glpsol, determine the optimal solution of this model.
4. If the optimal solution is implemented by the company, what raw materials will be the limiting factors for the production?