Sterile Insect Release

A proposed way of controlling pest/insect populations is to introduce sterile insects into the population, or spray chemicals which cause infertility. Let S be the population of sterile insects, and F the population of fertile insects. The F dynamics are given approximately by

$$\dot{F} = \left[\frac{aF}{F+S} - b - k(F+S)\right] F.$$

(a) Describe the meaning of the terms associated with a, b and k.

(b) Determine the critical value of S, S_c, such that the insect population is exterminated.

Note that the above solution would have required keeping the S population constant. But suppose that sometimes, healthy insects give birth to sterile insects, and the dynamics of S is given by

$$\dot{S} = cF - bS.$$

(c) Find the condition on a, b, and c, such that the insect population naturally dies out.

(d) Is this a good method of insect population control/extermination? Be practical.