



## XIX Congresso Brasileiro de Agrometeorologia

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Agrometeorologia no século 21:

*O desafio do uso sustentável dos biomas brasileiros*

**Climate change and food security: issues that affect the global population**



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**ABSTRACT:** The aim of this article is showing population grown as a phenomenon that is affected and cause issues on the environment, such as climate change and instability on food security. With the rising of population, the demand of food became larger and the environment has been damaged, for example high temperatures. While population grows more food is needed to be produced and the effects of this is a huge impact on the environment. Changes on the climate turn back the effects to the people, if once people affect changes on climate; it starts to affect people's life dramatically. Not only humans are affect by it, but all ecosystems. However, new methods are used to mitigate these issues and reduce the impacts on the environment. As well as those methods are putting in practices new perspectives of the future appeared.

**KEY WORDS:** Climate change, Population growth, Environment, Food security.

### **MUDANÇA CLIMÁTICA E SEGURANÇA ALIMENTAR: PROBLEMAS QUE AFETAM A POPULAÇÃO GLOBAL**

**RESUMO:** O objetivo deste artigo é mostrar o crescimento populacional como um fenômeno que é afetado e que causa mudanças no meio ambiente, como por exemplo mudanças no clima e instabilidade na segurança alimentar. Com o crescimento da população, a demanda de alimentos tornou-se maior e o meio ambiente vem sendo prejudicado, com o exemplo de altas temperaturas. Enquanto a população cresce mais alimentos são necessários para ser produzidos, com efeito disso há um grande impacto no meio ambiente. Mudanças no clima fazem com que os efeitos se tornem contra as pessoas, se eles ocasionaram mudanças no clima, isso começa a afetar suas vidas drasticamente. Não somente seres humanos são afetados por isso, mas todo o ecossistema. Entretanto, novos métodos são usados para mitigar esses problemas e reduzir os impactos no meio ambiente. Também com esses métodos são colocados em prática novas perspectivas para o futuro.

**PALAVRAS-CHAVE:** Mudança climática, Crescimento populacional, Meio Ambiente, Segurança Alimentar.

### **INTRODUCTION**

Population growth is a phenomenon that is hard to control. As the population rising, such as the people in eastern and southern Africa increased more than 50%, the demand for food increases at same time (FUNK et al, 2008). As result of this, occurs an intensification of agricultural production in a large scale or even in a small scale, as the case macro-block such as Europe countries (RUDEL et al, 2009) or in local communities (GUYOT et al, 2006).

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Climate change, also, has been an issue that affects considerable the agricultural production. Warming in oceans 'temperature (FUNK et al, 2008) or animal habitat' changes (GUYOT et al, 2006) have been caused several impacts on regions' economy and even behaviors. In addition, species as wheat, in some locations, have been changed and presented alterations on variety (ASSENG et al, 2011).

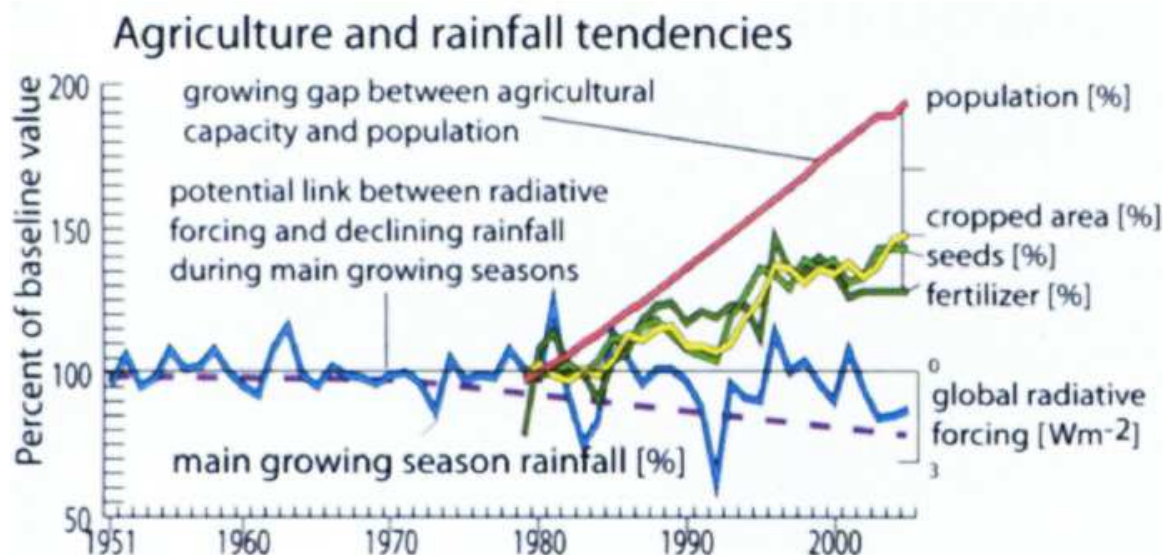
On the other hand, new solutions have been applied to mitigate those problems, using a developed agriculture that could, at the same time, reduce the climate change and the rural poverty in some areas. For example, at the Indian Ocean' cost of Africa, the researchers discovered a model that reorganize yields with rainfall seasons, then the farmer may mitigate loses on the field and produce more efficiently and provide a control of the population.

**DISCUSSION**

**Population growth and behaviors vs. climate change**

As the production of food increases, the population develops at the same time. During a period of time of 35 years the population has been grown 74.3% and the total of food production increased 123%, between 1970 and 2005 all around the globe (RUDEL et al, 2009). In eastern and southern Africa, as another example, the cultivation lands have been increased 50% in 25 years, affecting directly the population that has more than doubled. At the same period of time, in the same region, per-capita cropped land has been decreased 33%, however the population of food-insecure increased 50%. As effect of this, one in three children is underweight and almost 123 million people are incapable of sustain with food.

Local producers attribute this phenomenon to the rainfall deficit. The figure below shows a correlation between rainfall, population, cropped lands, seed use and fertilizer in that region in Africa. (FUNK et al, 2008)



**Fig. 1. Graph of rainfall, population, cropped lands, seed use and fertilizer in eastern and southern Africa (FUNK et al, 2008).**

Then, the interaction of agricultural trends and precipitation may be illustrated through verifiable models calculating the millions of those undernourished people (FUNK et al, 2008).

In a local point of view, as example of native people in Canada, the climate change is affecting their behaviors in terms of food traditions. Located at the extreme North Pole in Canada, those people have been affected by the impacts of global warming (GUYOT et al, 2006).

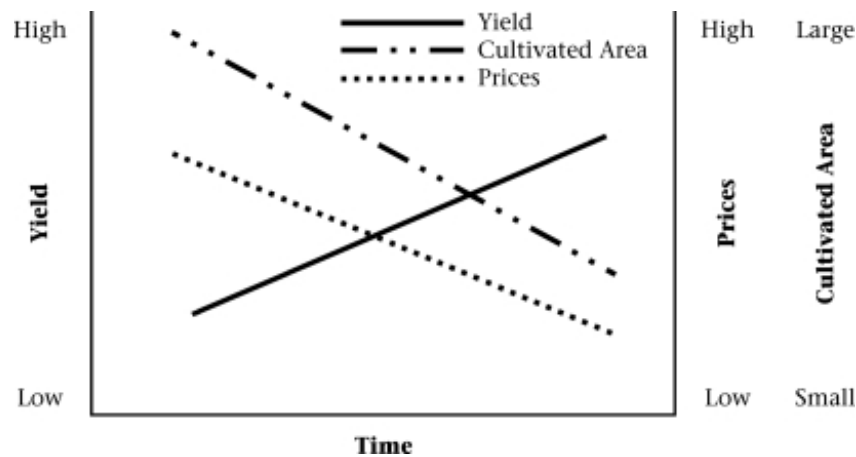
Those impacts alter the ecosystem in that area such as bird migration changing, increasing of invasive plants and alteration on the local plants' season, modification on the soil, emigration of animals

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etc. In terms of weather, the season have been changed, was intensify the risk of bushfire and earthquakes. As result of all of these, the traditional food crop has been changed at same time, forcing the locals to change their methods of cultivation and production (GUYOT et al, 2006).

**Agricultural intensification vs. cultivated areas**

While the population is growing considerable, cultivated areas are presenting a small percentage of growth. However, in terms of increasing yields, the cultivated areas have been declined (RUDEL et al, 2009), as is showed on the figure below.



**Fig. 2. Graph of Borlaug hypothesis of increases and decreases of yield, cultivated area and prices of agricultural products around the world (RUDEL et al, 2009).**

Then, as result of intensification of agriculture, cultivated areas increased less than population in the world, during 35-years-time. To solve or minimize it, the best way is grow the coupling agricultural intensification with land sparing and understand this relationship (RUDEL et al, 2009).

**Rising on temperatures is impacting yields**

Nevertheless, temperatures' rising should be considered. A small change on the scale, one degree high or low, may bring several damages to the environment (ASSENG et al, 2011). These changes have been affected, for example, the production of wheat. In Australia varies of more or less 2°C, may cause up to 50% of the reduction of the production.

**CONCLUSION**

Those articles show how could population growth and climate change, impact on the agricultural production in many parts of the world. Ideas of sustainability are being developed to mitigate those issues, however ideas of sustainability cannot come from top levels to low, and it needs to change. Each human being has responsibility to take care of the world and try to mitigate the problems from the local groups or communities to the world as whole. Everyone is capable to adapt while the world change, though it is better to be capable to change behaviors and take care of the future.

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### REFERENCES

Asseng, Senthold ; Foster, Ian ; Turner, Neil C, 2011. 'The impact of temperature variability on wheat yields'. *GlobalChangeBiology*(2011)17,997–1012,doi:10.1111/j.1365-2486.2010.02262.x.

Funk, Chris; Dettinger, Michael D. ;Michaelsen, Joel C. ; Verdin, James P. ; Brown, Molly E. ; Barlow, Mathew ; Hoell, Andrew. Stanford, CA, 2008. 'Warming of the Indian Ocean threatens eastern and southern African food security but could be mitigated by agricultural development'. *Proceedings of the National Academy of Sciences of the United States*, August 12, 2008, Vol.105(32), p.11081-6.

Guyot, Melissa ; Dickson, Cindy ; Paci, Chris ; Furgal, Chris ; Chan, Hing Man, 2006. 'Local observations of climate change and impacts on traditional food security in two northern Aboriginal communities'. *International Journal of Circumpolar Health* 65:5 2006, pp. 403-415.

Rudel, Thomas K., Schneider, Laura, Uriarte, Maria, Turner, B. L., Defries, Ruth, Lawrence, Deborah, Geoghegan, Jacqueline, Hecht, Susanna, Ickowitz, Amy, Lambin, Eric F., Birkenholtz, Trevor, Baptista, Sandra, Grau, Ricardo, Clark, William C. Cambridge, MA, 2009. 'Agricultural intensification and changes in cultivated areas, 1970-2005'. *Proceedings of the National Academy of Sciences of the United States of America*, 2009, Vol.106 (49), pp.20675-206803.