

Agricultural researches: a revision is needed

Introduction

Agricultural Researches are engaged by repetitive analysis, which is not applicable in many cases. Those topics which are reductionistic oriented could not extend to macro scales, because all situations will change with scale variation. In summary, these kinds of researches are limited in results extension to ecosystems. On the other hand, holistic-oriented researches also are not detached from basic sciences as the main candidate of reductionist based sciences. Therefore, interpretation of all phenomena in agriculture needs an obligatory marriage between these two sciences schools. For instance, ecophysiology is the case. Scaling up the consequences is the principal important character of this incorporated discipline to achieve the leading bases for making appropriate decisions for a secure-world in the next decades in respect to food supply for forthcoming population. I think agricultural researches should shift to new horizons of contemporary topics, new methods and new insights. Mean comparisons by ANOVA and other descriptive analysis are common in these kinds of researches, while corresponding results are uncertain in many cases and could change when even one of the involved factors varies by one or different causes (human-made or natural). On the other hand, one of the challenges which many researchers are faced by it is lack of quantitative data, specially numerical parameters, which are critical to quantify phenomena in different study scales, including cell, tissue, organ, organism, population, community and etc. System approaches, including crop simulation models, linear programming, GIS and RS are data-based. These approaches are progressing in use, markedly in biosciences, although are not old in emergence, development and application. These approaches assist us to save time and labor to make reasonable and validated findings and then being used in practice. These ways are an achievement of quantitative insight into related sciences. Furthermore, sensitivity and risk analysis is other gain of researchers shifts to quantify instead descriptive explanations about probable causes for actual effects. Therefore, it seems that at the first, study atmosphere should be revised from three perspectives: scopes, methodology and applicability.

A brief proposal for revising study scopes

- i. I think team working should be considered and multidisciplinary topics should be noted. Interdisciplinary topics are the main option to enhance audience's attraction and in turn motivation to direct new studies in the original path. This is the case, because ecosystems are affected by all determinants, limiting and reducing factors simultaneously. Therefore, decision making by an agronomist could not be perfect in the absence of entomologist, plant pathologist and other related disciplines. These kinds of researches are worthwhile, because the topic will direct us to the reality of ecosystems. Undoubtedly, related publications to multi disciplinary investigations also are more attractive for editorial boards and reviewers.
- ii. A topic is preferable to address common problems in regional scales. For example, we know a great portion of farmer's income will spend to overcome pests, weeds and diseases, while those investigations which are solution-based are scarce or are related to those studies which have been laid out in controlled situations, which are far from a real ecosystem.

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Behnam Kamkar

Department of Agronomy, Gorgan University of Agricultural Science and Natural Resources (GUASNR), Iran

Correspondence: Behnam Kamkar, Department of Agronomy, Gorgan University of Agricultural Science and Natural Resources (GUASNR), Faculty of Plant Production, Basij square, Pardis No. 2, 49189-43464 Gorgan, Iran, Tel +98-171-4427060, Fax +98-171-4427060, Email kamkar@gau.ac.ir

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- iii. I think recent publications should be balanced in topics. For example, there is an epidemic declination to solve the weeds problem using herbicides, while the cover crops as one of the promising options in the new agriculture have not focused well. For instance, if we search on statistics in Internet motor engines in the last five years, could find this imbalance. This is important that new publications should act as powerful documents to extend innovative concepts and practices. I think these topics should be considered as journals policy preferences.
- iv. Furthermore, we should shift from "field"- to "farm"- directed studies, because integrated farming is one of the most promising options to attain sustainability along with self-sufficiency and self-efficiency. Undoubtedly, in this case, incorporated experiments (greenhouse plus field experiments, multiple year or multi-site experiments) could be superior kinds.

New proposal for methods in agricultural researches

- i. Different methods should be revised to get more applicable and reliable results. In this case, mathematical models such as non-linear regression models, data mining methods, conceptual and process-oriented models provide examples. Derived equations, relations and parameters could allow us to apply them in systematic models and even develop and extend applicable softwares. Generation of databases for each given crop is essential to find their ecological niches to do some fundamental researches such as ecological zoning.
- ii. Descriptive statistics and ANOVA-based results limit us to extend the results, while we are seeking for those results which could be scaled up. Therefore, those packs which could estimate or predict bio-responses precisely have a widespread use.
- iii. Interface experiments also are invited. These kinds of experiments are a bridge to pass from ordinary experiments (for instance, plot-based or greenhouse experiments) to an intermediate scale. These experiments will enhance certainty or improve pre-known but uncertain results.
- iv. Data should be suitable to attain the study goals. For instance,

we should use soil temperature data to quantify a given crop emergence or develop corresponding response function, while meteorological data are used in many cases. This is the case for determination of those phenological stages which temperature is captured by underground meristems.

- v. Global movement of new methods which are environmentally friendly and sustainable oriented should be considered as priorities. For this, new sustained methods should be considered as a comparative treatment along with other methods.

Applicability and feasibility

Research results should be completed by a conclusion, including practical advises for farmers or illustrative plans for future researches. For this, good research should cover one of the following options:

1. Adding an unknown point, parameter, relation and so on to extend the knowledge frontier.
2. Responding or clarifying a contradiction in previous reports by other researchers to relieve other users or researchers from ambiguity.
3. Completing other imperfect studies.

Those researches which are based on aforementioned triple propositions are applicable in theory, but their applicability in practice is depending on researcher's viewpoint and skills.

Anyway, it seems that agricultural researches should be revised. New horizons along with new concerns have emerged and designing a new "plan" for new agriculture is necessary. I mean that new agriculture has sociopolitical, economic, cultural, technological and environmental aspects; therefore, all publications also should

consider the new agriculture nature. On the other hand, the base of agroecosystems failure or success has changed. Nowadays, agroecosystems are assessed base on efficiency per unit of limiting factor not per land unit. For example, yield per cubic meter of water is the more reliable index in dryland farming. Therefore, those measures which are used to judge of agroecosystems also should be revised and considered.

Finally, it seems that three important tasks should be considered for the agriculture researches: increase production, improve efficiency in the use of scarce resources and inputs application optimization. With regard to later issue, optimization should be replaced instead maximization viewpoint. Therefore, more sustainable-oriented methods, technologies and strategies also should be more noteworthy.

Furthermore, an important point is that those methods which are considered in researches should not be at the expense of research into the many other methods more certain to improve crop performance. I mean we should not exaggerate a topic uncaused and should be conservative in respect to extend some misleading opinions. To cut a long story short, I believe that holistic approaches that leverage all aspects of production are essential to success. These methods could open a window to more factual results. Agriculture needs a serious revision in researches to complete applicable and reliable datasets, which will provide a quantitative basis for more precise decision making and policy construction. I think different journals have an important and vital role to fulfill this goal.

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Conflict of interest

The author declares no conflict of interest.