



SDI Review Form 1.6

PART 1:

Journal Name:	American Journal of Experimental Agriculture
Manuscript Number:	2013 AJEA 3297
Title of the Manuscript:	The Efficiency of Nitrogen Fertilization of Spring Wheat Depending on Seasonal Rainfall

General guideline for Peer Review process is available in this link:

(<http://www.sciencedomain.org/page.php?id=sdi-general-editorial-policy#Peer-Review-Guideline>)

- This form has total 9 parts. Kindly note that you should use all the parts of this review form.



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PART 2: Review Comments

	Reviewer's comment	Author's comment <i>(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)</i>
<u>Compulsory</u> REVISION comments	1. Lines 21-22: I do not entirely agree with the statement as written (i.e. is "significant increase in yield" meant to portray "statistical significance" or a large increase?). In my experience, significant yield increases (large increases) due to fertilizer applications are often economically justified. Fertilizing beyond the most economic rate to achieve maximum yields is where there may be a statistically significant improvement in yield, but an obvious loss in profitability. 2. Lines 29-32: This sentence is poorly worded and difficult to follow. While I do not dispute the importance of available moisture for the efficient and effective use of fertilizer N, there seems to be a bit of a paradox in the thinking presented here. What is the benefit of accurately predicting the N rate for different moisture scenarios when I cannot predict the seasonal rainfall that I may get? I think it would be beneficial if the author provided his rationale for wanting to better predict N requirements under different moisture regimes. It is partially alluded to in terms of soil texture, but are there additional aspects of climate change, potential for irrigation etc. that would modify what a farmer would choose as a suitable rate given the uncertainty of "seasonal precipitation"?	1. This statement was based on the results of study by Rakowski (2003), presented in the paper entitled „Effect of sprinkling irrigation and mineral fertilisation on yielding of some spring wheat and spring triticale cultivars on light soil. Part I. Grain yield". Acta Sci. Pol., Agricultura 2(2), 19-31. (In Polish with English abstract). This position was added in the references. Moreover the sentence in lines 21-22 has been corrected. Now it is more explicit. 2. This statement has been improved. I agree that it is impossible to predict the sum of rainfall and its distribution in a given season. However nitrogen fertilization is usually applied in divided (splitted) rates. I meant that the amount of second and/or third part of nitrogen applied during the growth stages of tillering, shooting and earing may be modified according to available moisture and short-term weather forecast.



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	3. Line 42: I am assuming by “stocking rate” the author is referring to numbers of livestock animals per farm. Low stocking rates is not a problem in several regions of the world with intensive agricultural production and given the scope of the paper I don’t think this comment or sentence is needed. 4. Line 56: When one says “..plants were well supplied with rain water during emergencies...” it almost sounds as if plants were irrigated with rain water when needed. A wording change is required. Perhaps something like “In 2006, timely precipitation occurred during the critical plant growth stages of tillering and shooting (table 1) although the remainder of the growing season had significant moisture deficits.” 5. Lines 108 – 126: I am not familiar with some of the terminology the author has used here. This section is a little more confusing and verbose than it needs to be. I would suggest re-writing it in the following sequence: i) start off with yields were fitted to a quadratic model: $Y = aN^2 + bN + c$, where Y is the yield is wheat grain yield (kg/ha), N is the fertilizer N application rate (kg/ha), a is the intercept and b and c are regression coefficients. ii) taking the first derivative of the quadratic model allows for the calculation of the slope (i.e dY/dN) at any selected value of N. iii) setting the slope to zero allows the calculation of the agronomic optimal rate of N (AORN) that corresponds to the maximum yield (i.e. $0 = 2a(AORN) + b$, solving for AORN gives $AORN = -b/2a$). iv) setting the slope to equal the price ratio (PR) allows for the calculation of most economic rate of nitrogen (MERN) (i.e. $PR = 2a(MERN) + b$, solving for MERN gives $MERN = (PR -$	3. In the terminology we commonly use the term “stocking rate” meaning the number of livestock animals per agricultural land unit (e.g. 1 ha). In revised manuscript this statement has been removed. 4. This statement has been improved according with suggestion. 5. This part has been improved according with suggestions.
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	b)/2a). v) one can then discuss the values used to calculate the price ratio and thus the MERN. 6. The author should acknowledge the fact that the N fertilization treatment used in this study is potentially a function of both rate of N applied and timing of that application (i.e. for higher N rates, a different amount of N was applied bot preplant and during the growing season). A comment as to whether or not this would have possibly impacted either the AORN or MERN should also be considered. 7. I am a little confused as to what exactly was returned back to the soil following the catch crops. Is it just the postharvest residue or is it the entire biomass? In table 3, what residue is left after postharvest that is not part of the	6. I know, of course, that the effect of this factor is dependent on N rate, as well as its way of splitting and application time. Thus the way of N application has been clearly presented in the material and methods section. I agree that it is necessary to consider the effect of these two aspects of N application in the discussion section. In the revised manuscript, this aspect has been substantially improved in a subsection of discussion, entitled "Grain yield of spring wheat and its structure". In my opinion the presented study do not enable to assess the effect of way of rates splitting on AORN and MERN values. Each rate has been split in one way only and cannot be compared with another way of N splitting because of the difference in N amount applied. These 2 subfactors (rate of N applied and timing of that application) must be considered together. The way of N application depends on the amount of N applied and is well known from previous research. Low rates should be applied as a whole before sowing (this way is the cheapest) and high rates should not be applied as a whole before sowing because of N losses from soil and a lodging risk. 7. Each part of plants was weighed separately and subsequently all produced biomass of catch crops has been plowed in the autumn (green matter and post-harvest residue). I agree that the words used
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	aboveground plant parts? I would have thought total above ground biomass would have included all the plant material above ground, the postharvest biomass, would have been what was left in the field after harvest, and the difference between these two numbers would be what was removed as yield. I don't understand why the author has added above ground plant parts and crop residue together. Perhaps it is just a poor choice of words. 8. Lines 200-202: How was the comparison between 40 kg N with catch crop vs 80 kg N in the control carried out? I do not see the statistical results for this comparison made anywhere. 9. In discussion about the different catch crops, it might be useful if the author considered the potential differences in root:shoot ratios of the crop species used. He only measured above ground biomass which is not necessarily the best indicator of N immobilization or uptake by the crop.	in the manuscript to present this part of my study should be improved. In fact, the parts of plants named "aboveground plant parts" in the manuscript concern only this parts of plants which have been cut (about 5-7 cm above ground level). Whereas "post-harvest residue" concern stubble and roots of plants. In the revised manuscript it has been improved. Phrase "aboveground plant parts" has been replaced by phrase "green matter" which is more suitable to these parts of plants. 8. It has been confirmed based on Student T test made for yields of spring wheat obtained from every experimental plot in every year of research. Tests were made separately for difference between yields obtained after oilseed radish and 40 kg N per ha in comparison with yields obtained in control and 80 kg N per ha, as well as yields obtained after field pea and 40 kg N per ha, in comparison with yields obtained in control and 80 kg N per ha. In both cases differences between tested groups of results were not significant. In the revised manuscript adequate information has been added in the material and methods section. 9. In fact, the total biomass of plants has been measured and plowed in. The way in which biomass was measured has been described above (in answer to point 7) and in material and methods section. In this part of manuscript (lines 264-269) I was intended only to discuss the reasons of differences in post-harvest residue:green matter of
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	10. In several places the authors indicates that a given N rate is not profitable. The only time the pplication of N is unprofitable is when the increased value of the crop is less than the cost of fertilizer applied. So applying N to get maximum yield is usually profitable, but not as profitable as applying at the MERN.	the crop species used. My earlier studies indicate that most amount of biomass and nutrient is usually accumulated in above ground part of plants. E.g. Wilczewski et al. 2006: Effect of nitrogen fertilization on the yielding and health status of selected non-papilionaceous plant species grown in stubble intercrop. EJPAU, Ser. Agronomy 9(2): #04.; Wilczewski 2004: Effect of fertilization methods on the biomass productivity of non-papilionaceous plants grown as stubble intercrop. Acta Sci. Pol., seria Agricultura 3(1), 139-148; Wilczewski and Skinder 2005: Content and accumulation of macroelements in the biomass of non-papilionaceous plants grown in stubble intercrop. Acta Sci. Pol., seria Agricultura 4(1), 163-173. (In Polish with English abstract). 10. Each time I wrote about the lack of effectiveness of N rate it concerned only this part of the rate which exceeded MERN. According to my knowledge, each kilogram of N above MERN results in a decrease in the obtained income.
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<u>Minor</u> REVISION comments	1. Line 52: Wording change “...on the basis of two factors by a field...” 2. Line 76: It would be far more informative to the reader to give the actual soil test values and the soil test method, than to just say the soils were rich in P and K with average Mg. 3. Lines 80-82: If catch crops were harvested and yield determined, what was returned back to the soil? Again I think the author needs to give a bit more detail as to what was done. I assume a small area of the plot was harvested for biomass production and the biomass on the rest of the plot returned to the soil through cultivation. 4. I am not familiar with the term “roller aggregate”. Does the author mean “roller packer”? 5. Lines 94-95: Does “observations and measurement unit” simply mean “weather station”?	1. This statement has been improved. 2. These values have been added. 3. The total biomass of plants has been measured and plowed in. The way in which the biomass of green and dry matter was measured has been described above (points 7 and 9) and has been improved in material and methods section. 4. I meant crumbler roller. It has been improved in the manuscript. 5. Yes it does. This phrase has been improved according with suggestion.
<u>Optional/General</u> comments	Throughout the entire paper I was questioning the usefulness of determining the impact of water on crop response to N when one could not predict the rainfall a given season would provide. It was not until	In my opinion, determining the impact of precipitation amount on crop response to N is useful in spite of impossibility to predict the sum of rainfall and its distribution in a given season. Nitrogen fertilization is usually applied in split rates and we can modify the amount of second and/or third part of nitrogen applied during the growth stages of tillering, shooting and earing according to current moisture regime.