



SDI FINAL EVALUATION FORM 1.1

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

PART 2:

FINAL EVALUATOR'S comments on revised paper (if any)	Authors' response to final evaluator's comments
For the most part the author has done a very good job of addressing the points I raised in my earlier review. Just a couple of points I would like to make which I think will improve the quality of the paper. - Lines 34-36: I am not certain why the author is focussing only on the availability of elements mineralized from crop residues. Are you thinking mainly of N or is it all crop nutrients? If it is all crop nutrients then would it not be the availability of these nutrients in soil (not just from the mineralization of crop residues) that is the factor in determining crop response to N? I mean the premise being presented appears to be the one of the most limiting nutrient or factor. So whether say P comes from crop residues or from other soil reserves doesn't really matter if it is still limiting crop response to applied N. Given that the following sentence refers to water availability, may I suggest the following wording for this sentence: "The observed most economical rate of nitrogen (MERN) will also be dependent upon the availability of other plant nutrients that may limit the responsiveness of the crop to applied fertilizer N. - I absolutely agree with the author's comment on split applications. I suggested a sentence that clearly gives this rationale to the reader in lines 25-27. One still would need to be cautious that the current research does not necessarily provide good information on say a moisture stress late in the season vs all season vs early in the growing season (e.g. would there be benefit of N application at a later time say BBCH 45, if the early season was moisture stressed and there was adequate rainfall later on?). - Lines 43-45: I know what the author means, but one can argue that moisture content affects crop response to fertilizer N regardless of soil texture. The point I think that needs to be expressed is that lighter soils are more prone to droughty conditions and thus one might want to pay closer attention to N rates on these soils. I have suggested a wording change to reflect this. From an environmental standpoint, over fertilizing with N on these soils could also lead to greater nitrate leaching. - Lines 105-107: Can the author indicate what the extracting solution/procedure was for these elements? Without knowing what soil test procedure was used a reader has no idea what the numbers really mean, and more importantly cannot relate these soil conditions to their own work. - Lines 70-75: I think these lines can be effectively summarized as suggested. If you are assessing the impact of cover crop, it is implied that there must be a no-cover crop treatment. - I apologise for a mistake I made on the discussion about the quadratic equation. I am use to writing the equation as $Y = a + bN + cN^2$ so I referred to a as the intercept and c as a regression coefficient, that was my mistake and I corrected it on the revised	- That's right. In fact I thought about nitrogen as the most effective nutrient, but I agree that others can influence AORN and MERN too, especially when they are in low amount in soil. In the revised manuscript this sentence has been improved according to suggestion. - I agree. This sentence has been included to the introduction section in the revised manuscript. - I agree. This sentence has been included to the introduction section in the revised manuscript. - This information has been added - This sentence has been improved according to suggestion - Thank you for your accuracy.



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manuscript. Line 158.

7. I would argue that the author really is only concerned about calculating the maximum of the regression functions as opposed to the extremum which could be either a minimum or maximum. The suggested wording would allow the same concept/method of calculating the AORN and MERN.
8. Lines 178-180: I missed this point in my first review. Normally one would not factor in the cost of N application. Given the author is including N application costs, the different N rates would also have different PR values as the more splits for N application the greater the application costs (i.e. the different rates have different costs associated with them). I would strongly suggests removing the application costs from the determination of the PR.
9. Lines 332-334: Something does not seem correct with the N_{Eff} calculations. If there is basically little response to applied N in 2008, how does applying 40 kg of N result in a high efficiency? For example in figure 3, 2008 data says the effectiveness of N fertilizer at 0-40N was > 10. But according to table 6, maximum yield increase for the different catch crop treatments was only about 180 kg/ha (for the C) which would give a N_{Eff} of only 6.5. It just seems odd to me to say there was a very high N_{Eff} when AORN and MERN indicate very minor yield responses in 2008. Please check these numbers = again, especially for 2008 data.
10. Lines 373-374: It was stated in the materials and methods that the site had abundant P and K so soil fertility does not appear to be an issue. Do you mean productive, which would factor in the water holding capacity of the soil?
11. Lines 375-376: Again I would caution the author that the current study cannot distinguish between the effects of rate and timing.
12. Lines 436-437 say N_{Eff} was low and yet lines 331-333 say it was high. Which was it?

7. I agree. This sentences have been improved according to suggestions.

8. I agree that “the different rates have different costs associated with them”. However in my experiment particular rates were applied in different splitting manner. 40 kg N – 1 application time; 80 and 120 kg N – 2 application times; 160 kg N – 3 application times. Thus the cost of N application was different for particular rates and cannot be omitted. In my opinion including the cost of N application in the fertilizer price is adequate to experimental and practical conditions.

9. I checked my calculations and they are correct. Moreover I have placed below a sample of my results to confirmed the accuracy of my calculations.

Table 1. Effectiveness of N applied in spring wheat grown after field pea catch crop in 2008

Rate of N [kg/ha]	Grain yield at NX [kg/ha]	Grain yield at NX-40 [kg/ha]	$N_{Eff} = (\text{yield at NX} - \text{yield at NX-40})/40$ dY/dN
0	2138		
40	2585	2138	11,18
80	2353	2585	- 5,80
120	1650	2353	- 17,58
160	1670	1650	0,50

10. In the materials and methods I have written “The soil was abundant in available phosphorus and potassium” – I meant a high content of P and K. As I understand the term “fertility” refers to both the abundance and also the ability to satisfy the needs of plants. Maybe the term “productive” is more adequate to describe this feature of soil. Thus I have changed it according to suggestion.

11. I completely agree that these 2 subfactors (rate of N applied and timing of that application) should be considered together. My intention was to stress the positive effect of nitrogen applied late at growing stages (BBCH 45-47) on the 1000 grain weight in spite of the low effectiveness of earlier applied rates of N.

12. In my opinion, it is not an inconsistency. Statement in lines 331-333 concerns only N_{Eff} in the range from 0 to 40 kg N per ha, whereas in lines 436-437 it means N_{Eff} in range from 40 to 160 kg N per ha. Maybe using the word “very” in line 331 was inappropriate. Thus in the revised manuscript this word has been removed and the sentence in lines 436-437 has been improved.