HOW TO CHOOSE VARIETIES FOR YOUR FIELD VARIABILITY

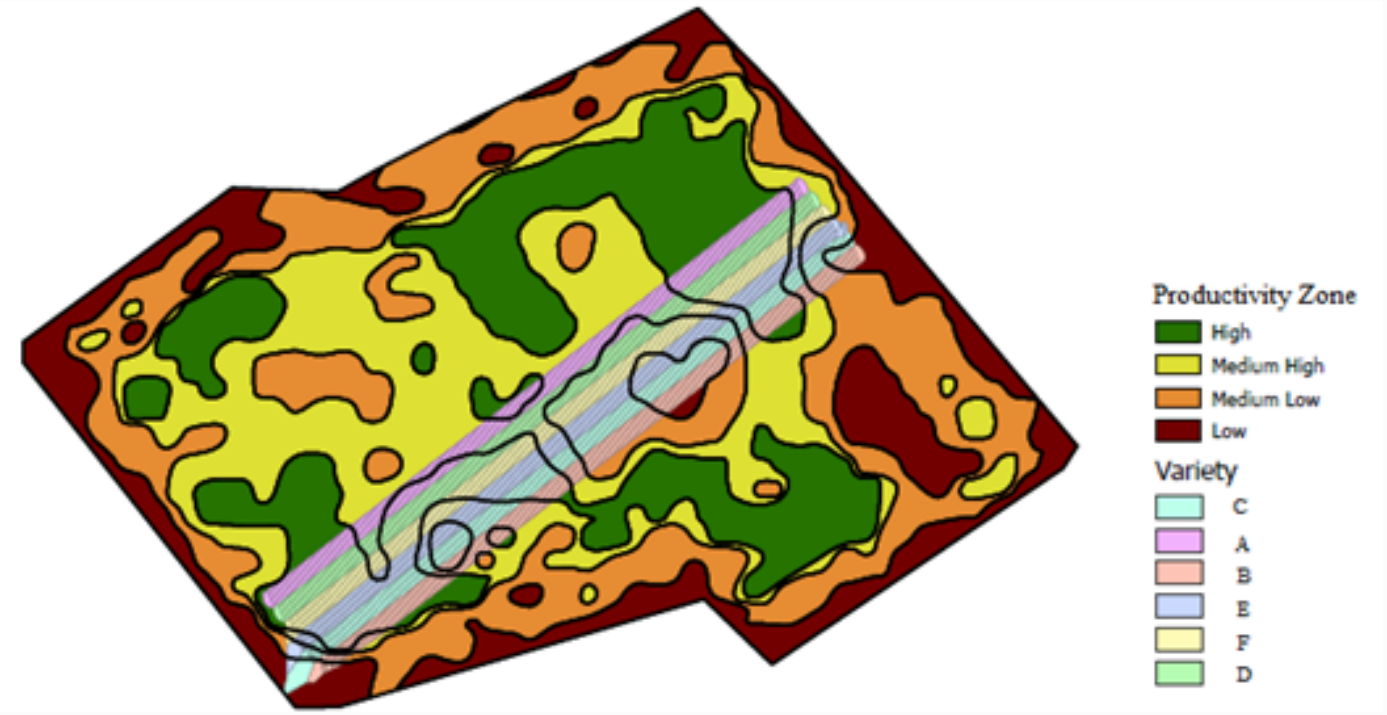
Variety Performance Trials Placement & Yield Estimations: A Case Study

TRADITIONAL VARIETY PERFORMANCE TRIAL

Are the results accurate?

Crop genetics are improving and changing every year and many farmers are interested in testing multiple varieties to see which perform best on their fields.

A simple trial is outlined above. In this case, the farmer planted 6 varieties in strips the length of the field. The map shows the location of the strips and the table gives the average yield for each variety strip. For this information, we would logically conclude that variety D performed the best, and perhaps decide that next year variety D will be planted as the main variety in this field.



Every variety responds differently to each production zones of a field

THERE IS MORE TO PLOTS THEN JUST YIELD

Can we answer how each variety will respond to different production areas?

At Deveron we dig a little deeper to ensure our conclusions are based on all the information available to us. The first step we take is to incorporate productivity zones into our analysis. Given that varieties have been bred for different qualities, we know that they respond differently to environmental conditions, and soil quality plays a role in that. A racehorse variety that excels in ideal conditions may perform very well in the more productive areas of a field but be outperformed by a more consistent variety in the less productive areas.

In the map above, we have include productivity zones in addition to the variety strips.

The first thing to note is that not every variety was planted in every zone. This will result in some missing information, but understanding what data we are missing is also important.

From this information we get the following table (below). For each variety, we can determine how well it yielded in each productivity zone. The different colours indicate which values are significantly different from each other in each zone. For example, in the High productivity zone Varieties B, D, and F yielded the highest, and although variety D has the highest average, it is not statistically different from the average yield of varieties B and F.

Average Yield for each Variety by Productivity Zone

	Variety					
Productivity Zone	A	B	C	D	E	F
High	207.87	211.00	192.10	215.94	191.25	211.42
Med High	198.69	208.99	188.64	201.77	185.53	197.96
Med Low	193.99	198.76	165.01	191.52	168.31	186.91
Low	NA	176.46	148.71	NA	169.24	184.50

* colours indicate significance groups (p = 0.1) within each productivity zone

USING PERFORMANCE TRIALS TO CHOOSE WHAT VARIETIES TO PLANT

How can plot data help you decide which variety will perform best in your field?

If you plan to plant multiple varieties in a field, the previous table provides most of the information you need. Depending on your planting capabilities, you may choose to plant variety B everywhere except the lowest yielding areas, where you would plant variety F. Or you may really like the high zone average of variety D - even though it is not statistically different from varieties B and F - and decide to plant that on your best land.

If you do not have the capability or desire to plant multiple varieties across the field, then we would take one more step. The table below includes the total acres of each productivity zone within the field. By multiplying the average yields from the table above, by the total number of acres in each zone, we can estimate which variety would maximize yield across the whole field.

Estimated Yield of Whole Field for each Variety

		Variety					
Productivity Zone	**Total Acres**	A	B	C	D	E	F
High	7.79	1618.96	1643.33	1496.20	1681.86	1489.57	1646.60
Med High	8.33	1655.86	1741.67	1572.08	1681.58	1546.21	1649.80
Med Low	8.63	1675.07	1716.32	1424.87	1653.76	1453.35	1613.93
Low	4.90		865.29	729.23		829.88	904.76
Total	29.7	4949.88	5966.61	5222.38	5017.21	5319.01	5815.08
Average bu/ac		**166.88**	**201.16**	**176.07**	**169.15**	**179.33**	**196.05**

Using only the information we have, we estimate that variety B would produce the highest yield if planted across the whole field at about 201 bu/ac.

However, this is where our missing data - no information on how varieties A and D perform in the low productivity zones will cause some issues. The lack of data results in disproportinately low yield estimates for these two varieties.

Placing variety performance trials in all productivity areas is critically important to ensure accuracy of data results

One solution is to use an average yield to fill in the blanks. In this case, we could average the low zone yield values from the other 4 varieties, and use that as an approximation for our missing data. In that case, we get the table below. Of course the best solution is to place your variety strips so that they cross every zone, because without actual measurement we really don't know how a variety will behave. However, short of that, this method will at least give you an idea of what to expect.

In the below table example, the field is composed similarly sized High, Medium High, Medium Low and Low zones. the low zone makes up far less of the field. As a result, a variety that has a poor performance in the low zone is less detrimental than it would be if the low zone made up a larger portion of the field. This highlights the importance of field composition in conjunction with variety performance when selecting varieties.

In summary - different varieties are bred to excel under different circumstances. As a result, summarizing yield averages over a test strip can miss important information and skew results. Understanding how each variety performs across different production zones is one way to improve understanding and help inform data driven decision making.

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Low	4.90	832.00	865.29	729.23	832.00	829.88	904.76
Total	29.7	5781.88	5966.61	5222.38	5849.21	5319.01	5815.08
Average bu/ac		**194.93**	**201.16**	**176.07**	**197.20**	**179.33**	**196.05**

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