



Twitter tweets (posts) have led to **4,989** impressions, **507** media views, **318** engagements with an average engagement rate per post of **7.1%**, **77** total clicks, **63** likes, and **41** retweets.



Instagram posts have reached **1,584** accounts, led to **1,848** impressions, **46** profile visits, **13** link taps, **246** likes, and **11** shares.

Reels reached **676** accounts, **786** views/impressions, **101** likes, and **8** shares.



Facebook posts have reached: **1,372** people, led to **111** engagements, **1,610** impressions, **80** total clicks, **95** likes, and **7** shares.



GLOBAL REACH OF TWEETS X



SOCIAL MEDIA PLATFORM SUMMARY BY METRIC

*Average Metric Unit per Post

Platform Averages	Impressions (views)	Engagement	Likes	Accounts Reached	Top Content Theme	Top Media Type	Top Hashtag
Facebook	51.94	3.58	3.06	44.26	Shout out to team	Informational images	#wholegrain, #regenerativeagriculture, #sustainableagriculture
Twitter	138.58	9.09	2.33	-	Shout out to team	Informational images	#soilhealth
Instagram	88	-	11.71	75.43	Education/outreach	Informational images	#regenerativeagriculture
Instagram Reels	71.45	-	9.18	61.45	Shout out to team	Informational videos	#sustainableagriculture; #wholegrain

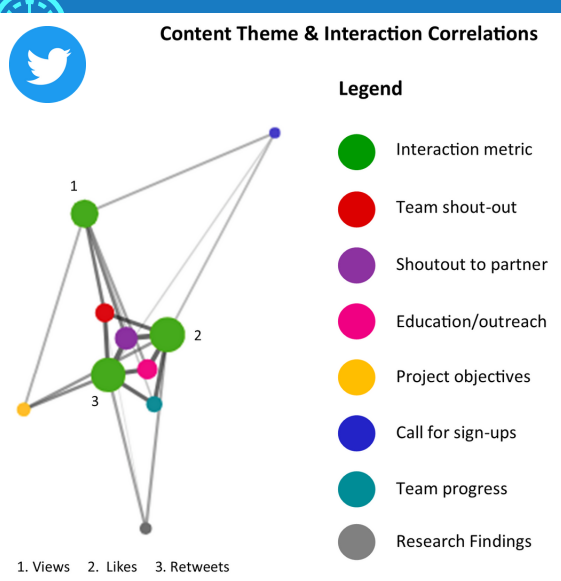
ACROSS ALL PLATFORMS, **MONDAYS** AND **THURSDAYS** TEND TO BE THE IDEAL DAYS TO POST WHILE **FRIDAYS** SHOULD BE GENERALLY AVOIDED TO OPTIMIZE INTERACTIONS.

FORCE-DIRECTED GRAPHS

Social media posts for each platform (Twitter, Instagram, and Facebook) were read and coded for naturally occurring themes. These themes were collected with respect to the content of the post's message itself, the type of media that was used in the post (i.e., image, URL link, video) if at all, and the hashtags used. To see if there was a relationship between these components and post interactions (i.e., if utilizing images in posts garnered more attention than a URL link), OEIE used Atlas.ti23 to run correlations (relative frequencies only; not a significance test) between themes and interaction metrics respective to the platform being analyzed, then visualized the results in Atlas's force-directed graphs. Force-directed graphs utilize algorithms that impose similar physics as van der Waal's forces onto the network, based on the correlations between the codes (nodes). Please refer to Appendix A for more details regarding the methodology and Appendix B for a summary of results.

- The **size of the node** is a function of **integration** - the larger the node, the more relationships that node has with other nodes.
- The **length of the 'edges'**, or lines between nodes, is a function of **how strong the correlation is** (a shorter length indicates those two nodes occur more frequently together than with others).
- The **thickness of the edges** is a function of **density** - the more frequently those nodes occur simultaneously, the thicker the edge.

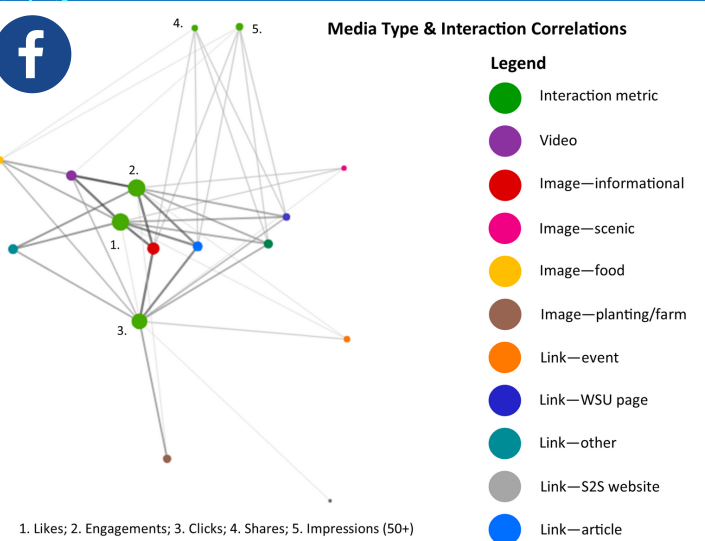
CONTENT THEMES



The message content of the posts from all platforms were coded for naturally occurring themes. Many themes were found (i.e., seven Twitter themes emerged in as demonstrated to the left; see Appendix B for more details). Themes were then graphed against the respective interaction metrics for each platform. In the case here with Twitter, interaction metrics included Views, Likes, and Retweets.

In the Twitter example to the left, **interaction metrics** most strongly correlated with **shout outs to team members, shout out to partners, and education/outreach** posts. This is visibly indicated by the larger size of these nodes and the short, thick edges between the respective thematic nodes and interaction metrics (particularly likes and retweets).

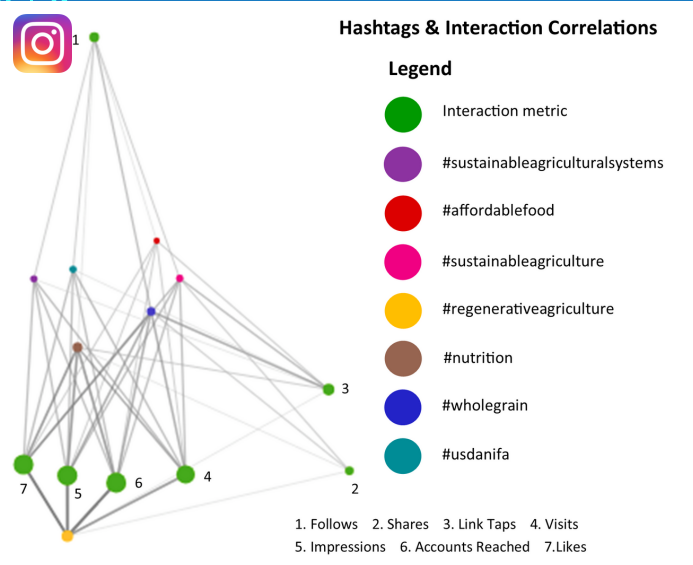
MEDIA TYPE THEMES



The media used in posts from all platforms were coded for naturally occurring themes (i.e., videos, images, links). Many themes were found (i.e., ten media themes emerged in Facebook posts as demonstrated to the left). Themes were graphed against the respective interaction metrics for each platform. In the case here with Facebook, interaction metrics included likes, engagements, clicks, shares, and impressions (views of 50+).

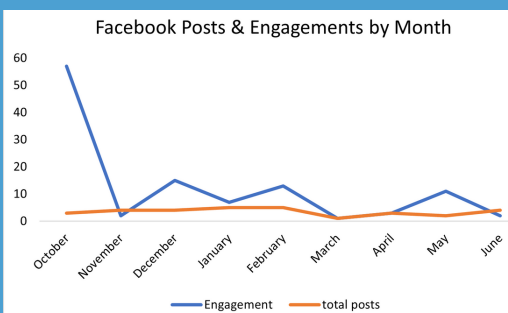
In the example to the left, **interaction metrics** most strongly correlated with **informational images, videos, and links to articles** (i.e., journal or magazine article). This is visibly indicated predominately by the shorter, thicker edges between the respective thematic nodes and interaction metrics (particularly likes and engagements)

HASHTAGS

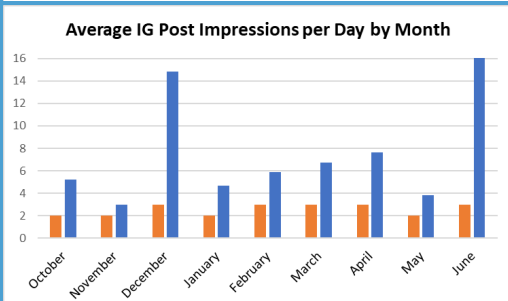


The hashtags used in posts from all platforms were coded for naturally occurring themes. These hashtags were graphed against the respective interaction metrics for each platform. Only the highest correlated hashtags were included in graphs due to the volume of hashtags employed. In the case here with Instagram, interaction metrics included follows, shares, link taps, visits, impressions, accounts reached, and likes.

In the example to the left, **interaction metrics** most strongly correlated with the hashtags **#regenerativeagriculture, #nutrition, and #wholegrain**. This is visibly indicated predominately by the shorter, thicker edges between the respective thematic nodes and interaction metrics (particularly likes, impressions, accounts reached, and visits).



Overall, engagements or impressions (depending on the metrics available by platform) as average frequency per post or day within a month were graphed over the course of data collection to see if there was a relationship between time/months and the collected metrics.



Unfortunately, no pattern has thus emerged across any platforms as exemplified by the results to the left. Such patterns may emerge as data collections continue and platforms gain more followers and activity.

DEFINITIONS

- **Impressions:** number of times content is displayed/viewed
- **Engagements:** number of actions your content received from users (likes, comments, shares, saves, etc.)
- **Clicks or "total clicks":** includes link clicks, post reactions, comments, shares, clicks to expand images to full screen, clicks to homepage, etc.
- **link taps (external):** number of taps on any of the links on your Instagram profile, excluding taps on your connected Facebook profile.
- **Accounts reached:** number of accounts that have viewed the post at least once.
- **Visits:** number of profile visits.

**Optimizing Human Health and Nutrition:
AFRI SAS From Soil to Society
Year 2 Social Media Pilot Study
Appendix A – Methodology and Limitations**

The USDA AFRI SAS Soil to Society project (S2S) has requested the external evaluators of the Office of Educational Innovation and Evaluation (OEIE) to assist in the evaluation of their program. As a part of these services, OEIE has gathered the project's social media data from their Facebook (now Meta), Twitter (now X), and Instagram platforms from October 2022 to mid-June 2023. The data was then analyzed and prepared as an infographic. The information provided is intended to assist the program gather evidence toward their project goals of outreach and information dissemination as well as provide insights in to how to optimize the use of the project's social media accounts. Appendix A provides an overview of the methodology employed in this pilot study, in addition its limitations. Appendix B provides the summative results of the pilot study.

Methods

Data Collection

As mentioned previously, data was collected between October 2022 (when the social media accounts were made) and mid-June 2023 to allow enough time for analysis and preparation for the annual meeting. As this was an investigative pilot study, all data that was publicly accessible and retrievable through the platform's internal analytical software were collected. All collected data sets were then compared to each other and to their respective posts, when possible (some data is only retrievable through other means and thus unable to compare to actual posts), to ensure validity. Due to the differences in data types and data retrieving tools available from platform to platform, the data collection methods and the type of data available varied as such (see Appendix B for a full list of metrics gathered):

- Facebook: Data was collected from Facebook by means of its internal data collection system "Meta Business Suite Facebook Insights".
- Instagram: Data was collected through two primary sources - the internal data collection system and through the Meta business Suite Facebook Insights (Instagram shares the Insights data as it is owned by Facebook). Data collected includes metrics separate for the reels, or short video clip posts, and regular posts.
- Twitter: The data for this platform was collected through the platform's internal data collection system, Twitter Analytics, in addition to API retrieval tools through the qualitative software NVIVO and Atlas.ti23 (online web scraping tools that retrieve analytics data). Due to changes in Twitter's data mining accessibility, Atlas.ti23's API was disabled for an unknown time and thus provided an incomplete data set.

For a discussion on limitations, please refer to the section on Limitations below. When applicable, duplicate posts were removed and self-comments were excluded from analysis.

Data Analysis

After data was compared and optimized for accuracy, all data was inductively coded for naturally occurring themes using Microsoft Excel and the qualitative software Atlas.ti23 (a computer-aided qualitative data analysis software or CAQDAS program). Atlas.ti23 is a software that does not analyze data but rather is a tool that supports the process of systematic qualitative data analysis (Friese, 2019).

Thematic analysis was employed to analyze qualitative data by searching for repeated patterns of meanings across a given dataset (Percy, Kostere, & Kostere, 2015). These themes were collected with respect to the content of the post message itself, the type of media that was used in the post (i.e. image, URL link, video) if at all, and the hashtags used. By coding 'ground up' from the data as opposed to coding with presupposed theories and frameworks, the analysis results yield a more accurate reflection of perceptions and beliefs of the social media posts (Braun & Clarke, 2006; Glaser, 1992). Data were coded independently and then compared for intercoder reliability and consistency. Upon agreeing on consistent codes and themes for intercoder reliability, the social media data were coded accordingly and then the frequencies of code occurrences were quantified for further analysis. Thematic analysis yielded several themes that are documented and summarized in Appendix B.

To see if there was a relationship between these thematic components and post interaction metrics (i.e., if utilizing images in posts garnered more attention than a URL link), OEIE used Atlas.ti23 to run correlations (relative frequencies only; not a significance test) between themes and interaction metrics respective to the platform being analyzed, then visualized the results in Atlas's force-directed graphs (see Appendix B for results).

Additionally, NVIVO was used for Twitter data to visualize the geographical reach of tweets and retweets (see infographic). The Twitter data was extracted from the official twitter handle of Soil to Society project using N-Capture extension tool of NVIVO 14 software. The map for twitter data was created using the Map tab feature of NVIVO software which helps to geo-visualize the location of the users. The number on a pin contained in the map represents the number of tweets and retweets from each unique location.

Limitations

The social media pilot study comes with the following limitations that should be heeded when considering the findings of the analysis:

- OEIE noted discrepancies between data exported via Meta Business Suite Facebook Insights, Instagram, Twitter Analytics, and APIs used by the qualitative software NVIVO and Atlas.ti23. These include discrepancies between likes, shares, comments, and other interaction metrics observable on Soil to Society platform pages and the data exported from the platforms themselves.
- Data exported from these platforms also contained inconsistent or incomplete metrics. OEIE attempted to resolve inaccuracies by comparing data across platform exports, the actual posts, and the data retrieved from Atlas.ti23 and NVIVO. However, some data were only available through platform exports and cannot be independently verified (Facebook impressions, reach, etc.). Due to this, some data (like that from Facebook) remains in its original state from the platform's export function. Posts that retrieved no metrics and that could not be further verified by other methods were excluded from analysis.
- Data analysis relied on correlations; however, they may reflect user's posting behavior as well.

Because of these limitations, the social media analysis results should be considered as representative of overall patterns and trends rather than a precise portrayal of social media interactions.

References

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Friese, S. (2019). *Qualitative data analysis with ATLAS.ti*. SAGE publications.
- Glaser, B. (1992). *Basics of grounded theory analysis*. Sociology Press.
- Percy, W.H., Kostere, K., & Kostere, S. (2015). Generic qualitative research in Psychology. *The Qualitative Report*, 20(2), 76-85.

Optimizing Human Health and Nutrition: AFRI SAS From Soil to Society Year 2 Social Media Pilot Study Appendix B – Compiled Results Summary

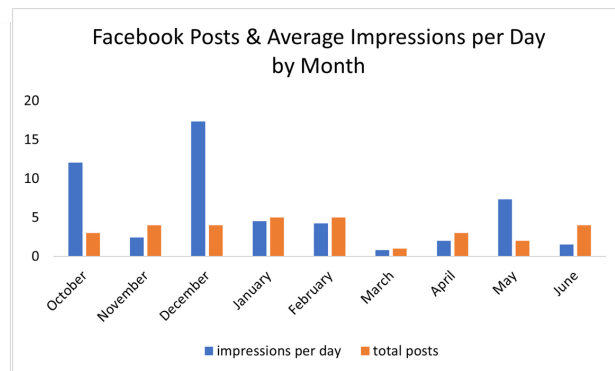
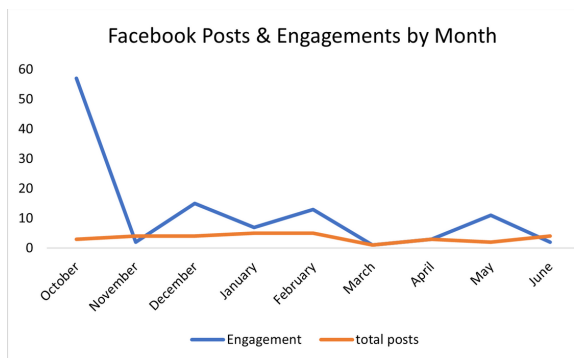
The following provides summary tables of the descriptive statistics of the metrics gathered by each platform, along with a visualization of average engagements and impressions by month. The descriptive statistics are then followed by an overview of force-directed graphs and their brief interpretations. Additional data (i.e., list of hashtags and frequencies) that were too expansive to include in this appendix can be provided upon request. Please see the infographic for metric definitions. Media and content themes are the naturally occurring themes that were inductively coded from the types of media included in a given post (former) and the actual content of the posts’ message (latter).

FACEBOOK: Descriptive statistics of Facebook metrics

Best days to post: Mondays and Thursdays

Least ideal day(s) to post: Tuesdays and Fridays

Posts	Engagements	Impressions	Accounts Reached	Likes	Shares	Total Clicks	Link Clicks	Photo Views	Avg. Video Views (sec.)
Average	3.58	51.94	44.26	3.06	0.23	2.50	0.56	1.16	5.93
Mode	1	21	20	1	0	0	1	1	-
Max	55	463	408	45	2	36	3	10	10.93
Min	0	10	10	0	0	0	0	0	0
Total	111	1610	1372	95	7	80	13	22	47.47



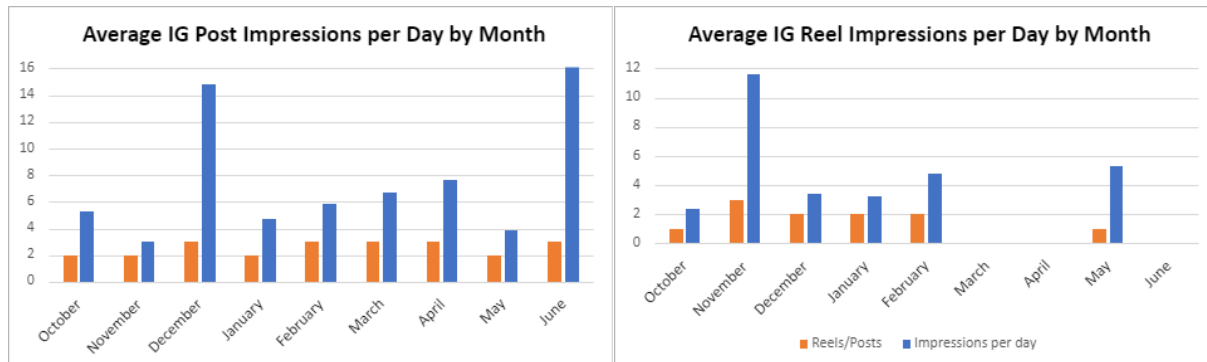
INSTAGRAM: Descriptive statistics of Instagram posts and reels metrics

Best days to post: Mondays and Thursdays

Least ideal day(s) to post: Tuesdays

Posts	Profile Visits	Impressions	Follows	Accounts Reached	Saves	Likes	Comments	Shares	Link Taps
Average	2.19	88	0.33	75.43	0.62	11.71	0.90	0.52	1.86
Mode	1	59	0	51	0	6	0	0	1
Max	6	290	2	277	2	25	6	6	4
Min	0	59	0	47	0	3	0	0	1
Total	46	1848	7	1584	13	246	19	11	13

IG Reels Posts	Views	Likes	Comments	Shares	Accounts Reached	Percent Reached non followers	Averaged percentage watched
Average	71.45	9.18	0.45	0.73	61.45	18.81%	17.80%
Mode	-	9	0	0	41	14.60%	42.86
Max	153	13	2	6	136	74.26%	259%
Min	31	7	0	0	41	4.1%	6.9%
Total	786	101	5	8	676	-	-

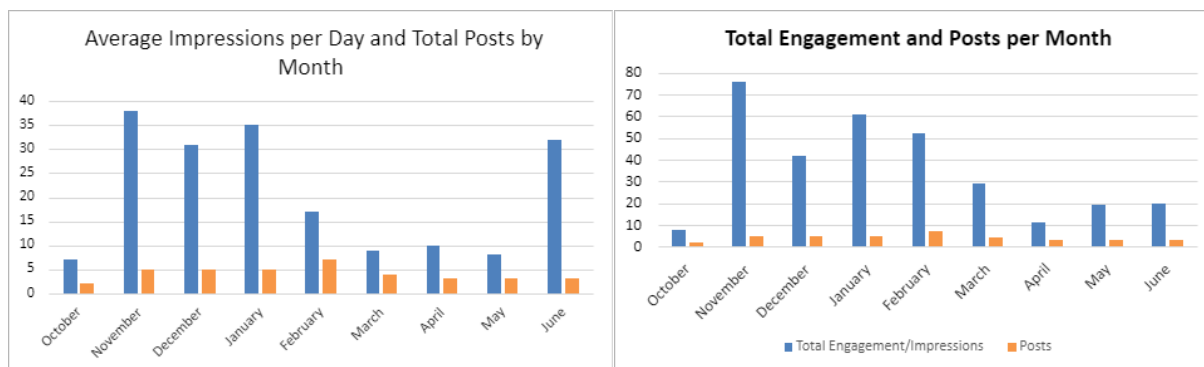


TWITTER: Descriptive statistics of tweet metrics

Best days and times to post: Thursdays and Tuesdays

Least ideal day(s) to post: Mondays

Posts	Engagements	Impressions	Retweets	Replies	Likes	User Profile Clicks	Link Clicks	Media Views
Average	9.09	138.58	1.64	0.44	2.33	2.78	2.08	50.70
Mode	1	23	1	0	3	1	1	-
Max	31	850	7	1	11	11	6	224
Min	0	15	0	0	0	0	0	11
Total	297	4626	41	4	63	50	27	507



OVERALL INTERACTION SUMMARY: Average metrics per post and top themes by platform

Best days to post across all platforms: Mondays and Thursdays

Least ideal day(s) to post: Fridays

Platform Averages	Impressions	Engagement	Likes	Accounts Reached	Top Content Theme	Top Media Type	Top Hashtag(s)
Facebook	51.94	3.58	3.06	44.26	Shout out to team	Info images	#wholegrain, #regenerativeagriculture, #sustainableagriculture
Twitter	138.58	9.09	2.33	-	Shout out to team	Info images	#soilhealth
Instagram	88	-	11.71	75.43	Education/outreach	Info images	#regenerativeagriculture
Instagram Reels	71.45	-	9.18	61.45	Shout out to team	Info videos	#sustainableagriculture, #wholegrain

From these results, it can be interpreted that Twitter and Instagram appear to garner the most attention from audiences per post. Additionally, it is worth noting from the bar and line graphs above that there appears to be no strong correlation between the time of year and popularity of posts. It is suggested that the themes summarized in the table (above) and the suggested posting days by platform be considered when posting on the respective platforms if leadership wishes to optimize the impact of their social media.

ATLAS.TI RESULTS

The qualitative software Atlas.ti23 (a computer-aided qualitative data analysis software, or CAQDAS program) was used to thematically analyze the social media data. Thematic analysis of qualitative data involves searching for repeated patterns of meanings across a given data set (Percy, Kostere, & Kostere, 2015). These themes were collected with respect to the content of the post message itself, the type of media that was used in the post (i.e., image, URL link, video) if at all, and the hashtags used. Thematic analysis results, in addition to likes, impressions/views, days of the week that the message was posted, and the time of posting, are summarized below. The hashtag data was too expansive to include in this appendix, but can be provided upon request.

Views/ impressions	Twitter	Instagram	Facebook
Less than 25	2	0	20
25-100	10	18	8
101-200	3	2	0
201-300	1	1	1
301-400	1	0	1
401-600	3	0	1
600+	2	0	0

Day of the Week	Twitter	Instagram	Facebook
Monday	13	6	9
Tuesday	19	1	4
Wednesday	11	7	6
Thursday	13	6	8
Friday	7	3	4
Saturday	3	0	0
Sunday	1	0	0

Time of Post	Twitter	Instagram	Facebook
Earlier than 8	0	1	15
800	0	4	4
900	0	1	3
1000	5	3	3
1100	8	0	5
1200	8	2	1
1300	3	4	0
1400	3	4	0
1500	9	1	0
1600	14	1	0
1700	7	0	0
1800	5	0	0
1900	1	0	0
2000	0	0	0
2100	3	0	0

Likes	Twitter	Instagram	Facebook
0	18	0	9
1	10	0	12
2	9	0	3
3	13	1	0
4	1	0	1
5	3	0	0
6	10	3	1
7	0	0	0
8	0	1	0
9	0	3	1
10+	3	13	2

Media Type	Twitter	Instagram	Facebook
Event Link	11	3	3
Image - Informational	21	17	10
Image – Planting/farming	3	1	5
Image – Other (i.e., scenic, food)	1	4	12
Link – Other (i.e., another post or profile, blog)	1	0	2
Link to article	1	2	1
Link to news article	6	6	6
Link to WSU page	2	1	4
Link to S2S website	7	6	1
Video	20	0	8

Content Themes	Twitter	Instagram	Facebook
Call for sign-ups (i.e., newsletter)	5	7	3
Education/Outreach effort (includes events like SoilCon)	17	15	8
Partner/external shoutout to S2S	1	0	1
Project objectives	8	0	7
Research findings	6	0	1
Shout out of team/team member	15	3	14
Shoutout to partner/leadership/advisory	22	11	11
Team member shout out of S2S	7	0	0
Team progress and events	11	4	5
Other (i.e., comments, trouble shooting, food)	6	4	0

Force-Directed Graphs

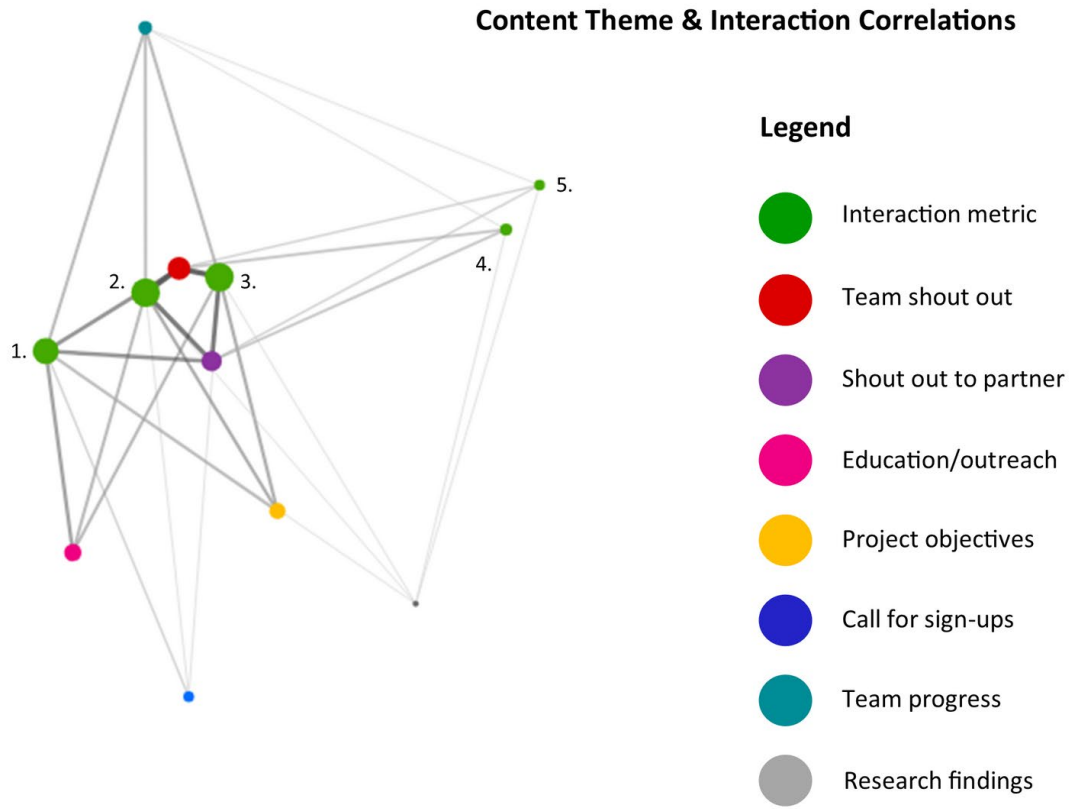
Force-directed graphs are a unique feature of Atlas.ti23's data visualization package and were used in this analysis to help gain insights into the social media data. Force-directed graphs utilize algorithms that impose similar physics as van der Waal forces onto the data network, based on the correlations between the codes (nodes).

- The **size of the node** is a function of **integration** - the larger the node, the more relationships that node has with other nodes.
- The **length of the 'edges'**, or lines between nodes, is a function of **how strong the correlation is** (a shorter length indicates those two nodes occur more frequently together than with others).
- The **thickness of the edges** is a function of **density** - the more frequently those nodes.

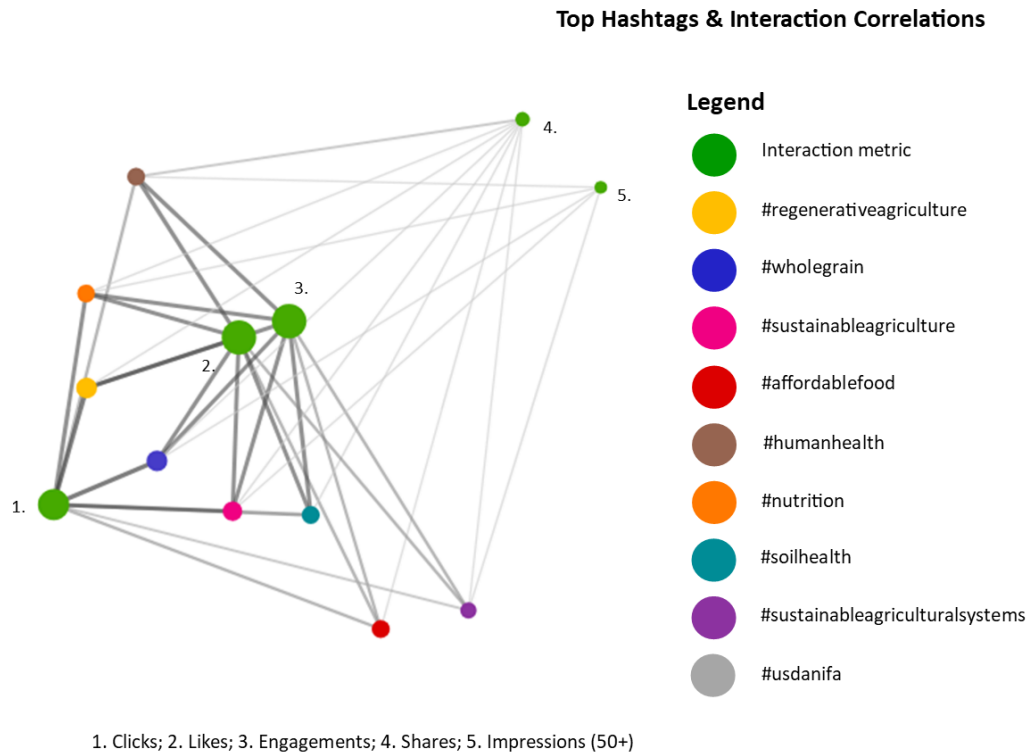
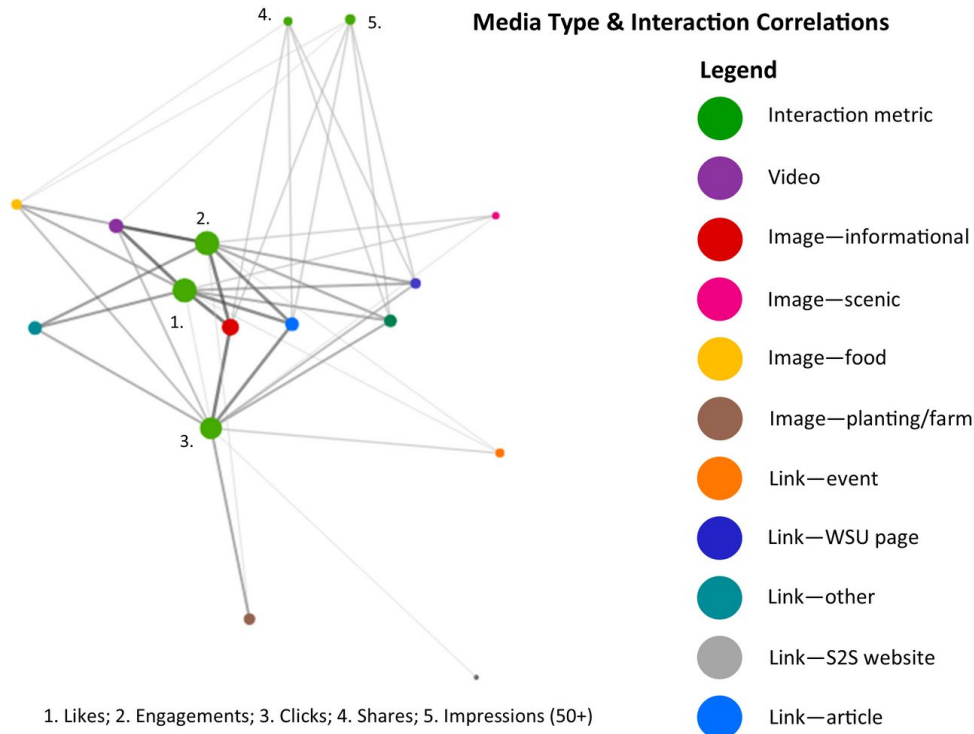
Central themes that emerged from analysis were graphed against different interaction metrics, including likes, retweets, views, etc. The type of interaction metric varied by platform, hence each visual may have slightly different interaction metrics. The following identifies the highlights of the force-directed graphs for each platform, identifying the top themes and hashtags (as indicated by the strongest relationships with interaction metrics). These top themes can be interpreted as the media type, message content, and hashtags that evoke the greatest interaction response from viewers. It is suggested that these themes be considered when posting on the respective platforms if leadership wishes to optimize the impact of their social media posts.

Facebook: Interaction metrics (engagements, clicks, likes, shares, and impressions (50+)) are most strongly correlated with the following:

- Content themes: team shoutouts, shout outs to partners, and education/outreach posts.
- Media type: informational images, videos, and links to articles.
- Hashtags: #regenerativeagriculture, #wholegrain, #sustainableagriculture



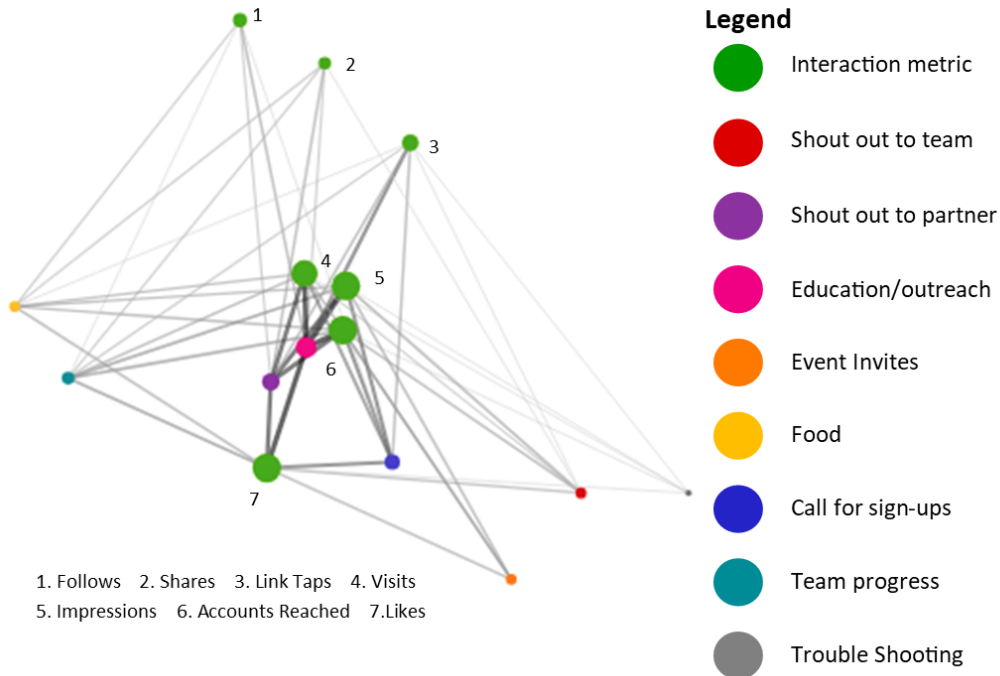
1. Clicks; 2. Engagements; 3. Likes; 4. Shares; 5. Impressions (50+)

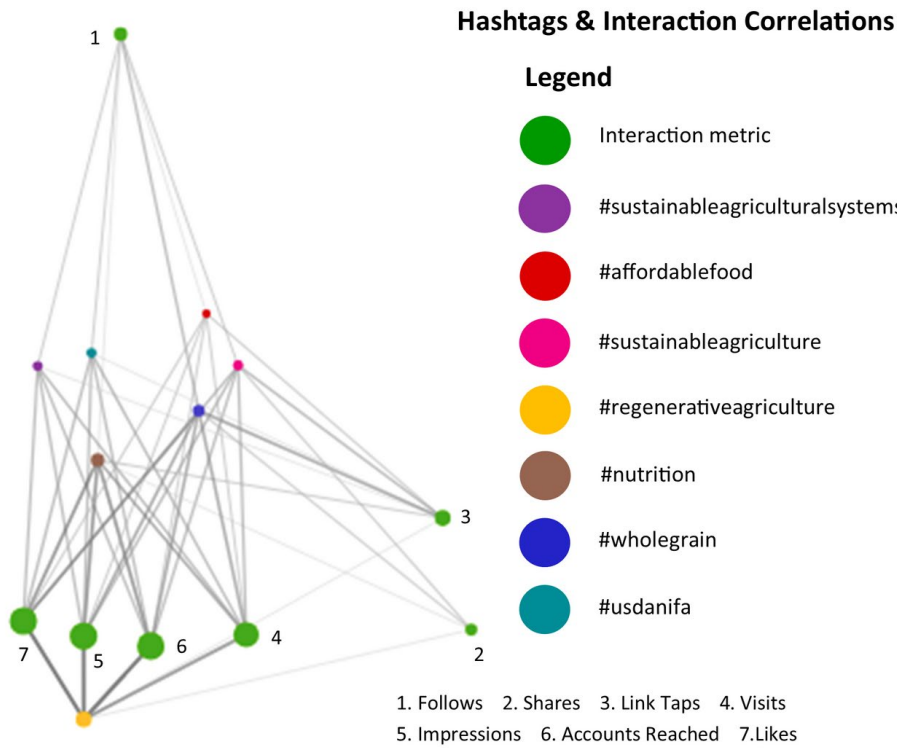
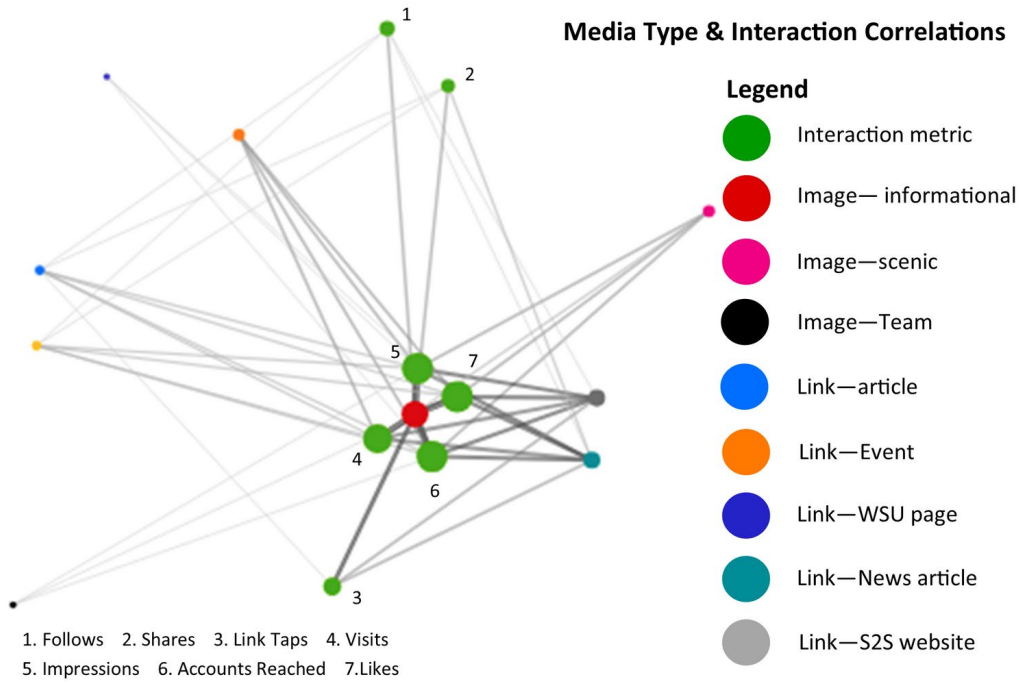


Instagram: Interaction metrics (follows, shares, link taps, visits, impressions, accounts reached, and likes) are most strongly correlated with the following themes:

- Content themes: education/outreach, shout outs to partners, and shout outs to team members.
- Media type: informational images, links to the Soil to Society webpage, and links to news articles.
- Hashtags: #regenerativeagriculture, #nutrition, and #wholegrain

Content Theme & Interaction Correlations



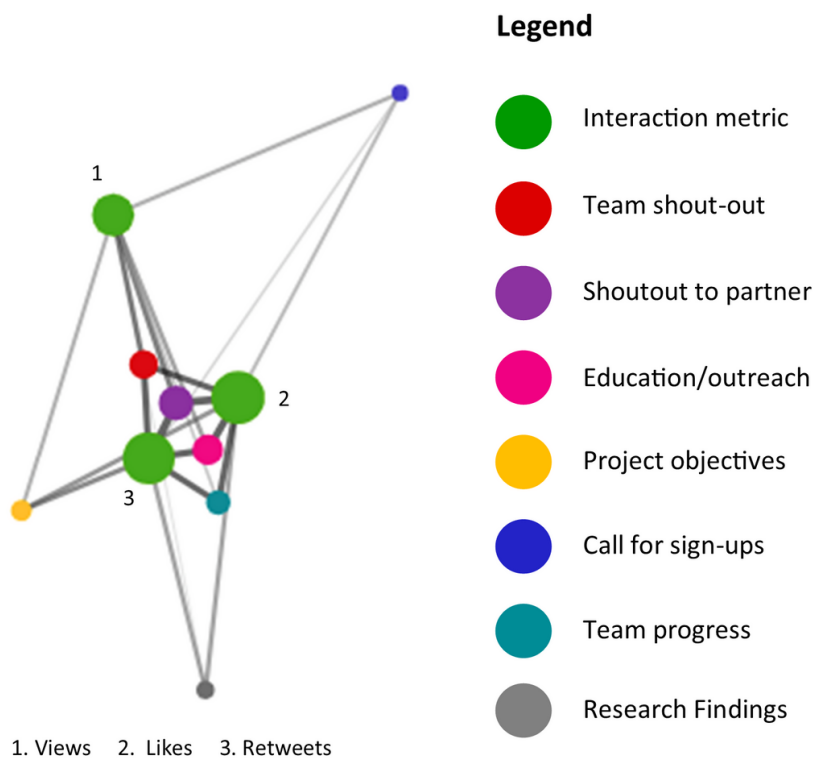


Twitter: Interaction metrics (views, likes, retweets) are most strongly correlated with the following themes:

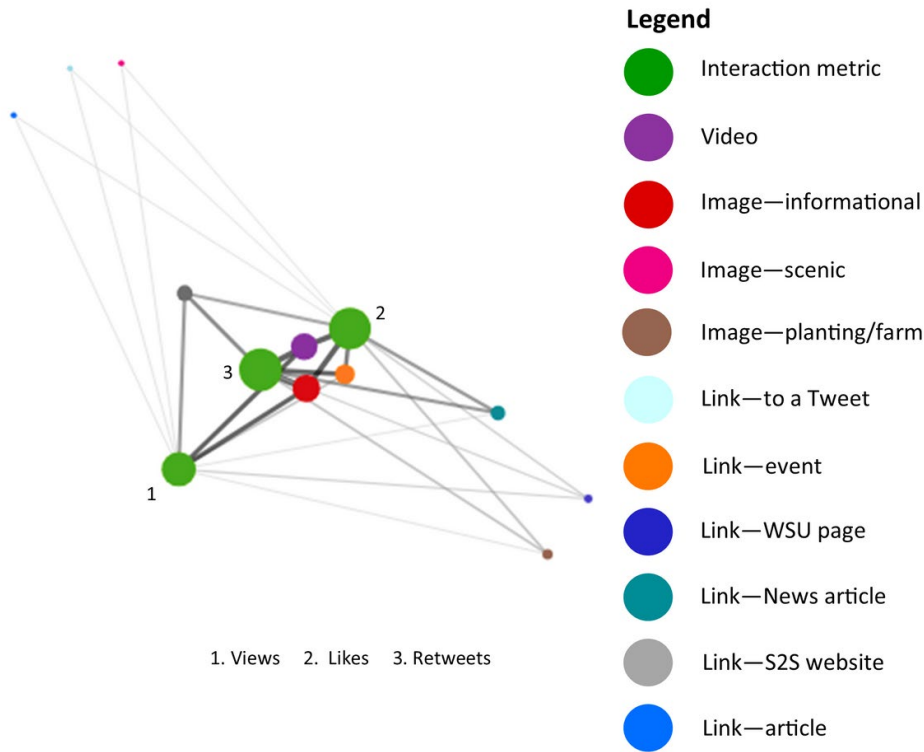
- Content themes: shout outs to team members, shout outs to partners, and education/outreach posts.
- Media type: informational images, videos, and links to the Soil to Society webpage
- Hashtags: #soilhealth, #affordablefood, #humanhealth, and #regenerativeagriculture.

Note: views in the hashtag force-directed graph were separated out into their subcategories in order to get a better visualization of the data.

Content Theme & Interaction Correlations



Media Type & Interaction Correlations



Top Hashtags & Interaction Correlations

