1976

1976 Summary of results - sowing systems - fallow re-assessment

D Tennant

SUMMARY OF RESULTS

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1. Sowing Systems - Effect on Mineralisation of Soil Nitrogen.

2. Fallow Re-assessment.

D. Tennant
Research Officer

I. SOWING SYSTEMS - EFFECT ON MINERALISATION OF SOIL NITROGEN

Several trials were initiated by G.A. Pearce and J.E. Holmes with a view to examining the efficiency of various sowing systems in controlling weeds, with special relevance to ryegrass. Additionally, the top soil at each site was monitored in varying detail for mineralised NH_4^+ and NO_3^-.

Locations

T. Kettle, Kendenup	- 76AL32	(Clipper barley)
J. & R. Erickson, Bolgart	- 76MO32	(Gamenya wheat)
M. Brown, Yillminning	- 76NA41-A	(Gamenya wheat)
R. Koch, Boddington	- 76NA41-B	(Gamenya wheat)
Esperance Research Station	- 76E33	(Gamenya wheat)

Sowing systems

1. Conventional cultivation - cultivated with first rains, additional cultivations when necessary, combine planted.
2. Spray seed - combine planted.
3. Minimum cultivation - single cultivation with first rains, chemical weedkill, triple disc drill planted.
4. Zero cultivation - chemical weedkill, triple disc drill planted.

Herbicide application

Chemical used - 'Spray Seed'

1. Spray seed operation - 2 l/ha five days prior to seeding.
2. Zero cultivation - split application of 1.2 l/ha followed ten days later with 0.8 l/ha.

Results

A. 76NA41-B, Boddington

Data for Ammonium and Nitrate N presented in Figure 1.

1. Ammonium and Nitrate N increased after cultivation with the conventional and minimum cultivation treatments.
2. These higher levels were maintained till planting (July 20) with Ammonium N and till mid to late August with Nitrate N.

3. After planting:

   a) Ammonium N increased with the spray seed and zero cultivation treatments to give higher levels than with the cultivation treatments. This was reflected in rising Nitrate N levels to early September.

   b) Ammonium N levels fell with the cultivation treatment. High Nitrate levels, due possibly to the cultivation effect of combine planting, were maintained till mid August with conventional operations.

Comment

The patterns evident at Boddington do not differ markedly from general expectation in respect of cultivation effect on stimulation of nitrogen mineralisation.

B. 76AL32, Kendenup

Data for Ammonium and Nitrate N presented in Figure 2.

1. Cultivation at this site was carried out prior to initial sampling for N. Mineralisation patterns were similar to those evident at Boddington except for:

   a) Very high Ammonium N after planting (July 6) with the spray seed treatment. This was reflected in high levels of Nitrate N for this treatment to the end of September.

   b) Greater effect of cultivation on mineralisation of N at Kendenup than Boddington - 45 ppm (Nitrate) at planting after cultivation vs 7.5 ppm at Boddington.

Comment

Continued high levels of Nitrate N with spray seed is a probable reflection of very poor stand establishment, and therefore limited uptake by the plant.

C. 76MO32, Bolgart

Cultivation had no consistent effect on mineralisation of N.

D. 76NA41-A, Yillminning

Sampling commenced six weeks after planting. Ammonium N and Nitrate levels were low and little different between treatments at all samplings after six weeks from planting.

E. 76E33, Esperance

The pattern of mineralisation of soil N was similar to that described for Boddington. Notably, however, the zero cultivation treatment gave high Ammonium levels throughout. No reason apparent for this result.

Comments on all trials

1. Performance of trials largely influenced by dry conditions, and presumably, limited experience with spray seed and triple disc drill operations.

   a) At dry sown sites, slot made by triple disc drill in zero cultivation treatment remained open - seed failed to germinate or were removed by birds and/or insects. At one location (Boddington) the farmer dragged a log over his triple disc drill sown paddock. Resultant closure of slot gave significantly better crop establishment than on trial site.

   b) Another reason for poor slot closure could have been low operating speed with the triple disc drill. Care taken to position drill within experimental plots worked against keeping recommended (high) speed.

   c) Direct drilling with a combine resulted in a very cloddy seedbed and eventual poor stand establishment. Planning for spray seed operations with "spray top" in the preceding year, heavy grazing before spraying, and a two to four day delay in planting after spraying is recommended.

2. Except with the early sown trial at Yillminning (May 28), the zero cultivation, and in particular the spray seed treatments, gave lowest yields - Data on yields included in report by J.E. Holmes.

   a) Not known whether early planting played a part.

   b) Generally, early growth was poorest with the spray seed and zero cultivation treatments, but picked up in time. At harvest plant size at least was generally little

different between all treatments. In this respect, sowing time could influence partition of resources for grain production.

c) Not known conclusively whether cultivation effect on mineralisation of N played a part - yield differences also evident at sites where Ammonium and Nitrate N differences were not very great.

d) As mentioned previously stand establishment was very poor with the spray seed treatment. The situation is not clear with zero cultivation. Where slot closure was achieved, plant numbers were little different from those established with conventional cultivation. Localised waterlogging in slot, and greater webworm and insect damage (noted at Boddington), are likely to have contributed to poor performance with zero cultivation. Early root growth was poor with zero cultivation, and to a lesser extent the spray seed treatment.

3 Soil type and location had varying effect on mineralisation of N. More work needed to identify situations where cultivation has high, average or little or no effect.

4. Weed count data to be supplied by J.E. Holmes.

5. Detailed long term work to be undertaken at research stations commencing 1977.

II. FALLOW RE-ASSESSMENT - 72M29

Location Merredin Research Station

Treatments

1. Long Fallow - maximum moisture storage treatment. Cultivated at first rains in establishment year and subsequently when necessary for weed control.
2. Mechanical Fallow - cultivated early July in establishment year after completion of seeding operations and then cultivated when necessary for weed control.
3. Chemical Fallow - sprayed with weedicide to kill pasture before seed set in the establishment year.
4. Short Fallow - left in pasture during establishment year and cultivated after summer rains, if any.
5. Pasture-Crop - left in pasture during establishment year and cropped in assessment year.
6. Continuous Crop - minimum moisture storage treatment. Cropped in establishment and assessment years.

Crop: Gamenya wheat.

Results

1. Yields in the assessment year (Table 1) were significantly higher with long fallow despite low rainfall in 1975.
2. Yields were better with chemical and mechanical fallow than the continuous cropping or pasture crop treatments. The advantage of mechanical fallow over chemical fallow evident in 1975 did not eventuate in 1976.
3. There was a greater difference in 1976 between yields from long fallow and mechanical or chemical fallow than in 1973 or 1975.
4. Lowest yields were obtained with the pasture-crop and continuous crop treatments. The short fallow treatment was not effective in 1976.

TABLE 1

Growing season rainfall and yields at Merredin in 1973, 1974, 1975 and 1976

Treatments*	Yields kg ha^{-1}			
	1973	1974	1975	1976
Continuous crop	1056	3445	590	533
Pasture crop	1547	3867	637	506
Chemical fallow	1445	3511	1063	740
Mechanical fallow	1570	3433	1410	730
Long fallow	1792	3167	1540	1043
	274mm	307mm	198mm	167mm

*Short fallow treatment not effective throughout

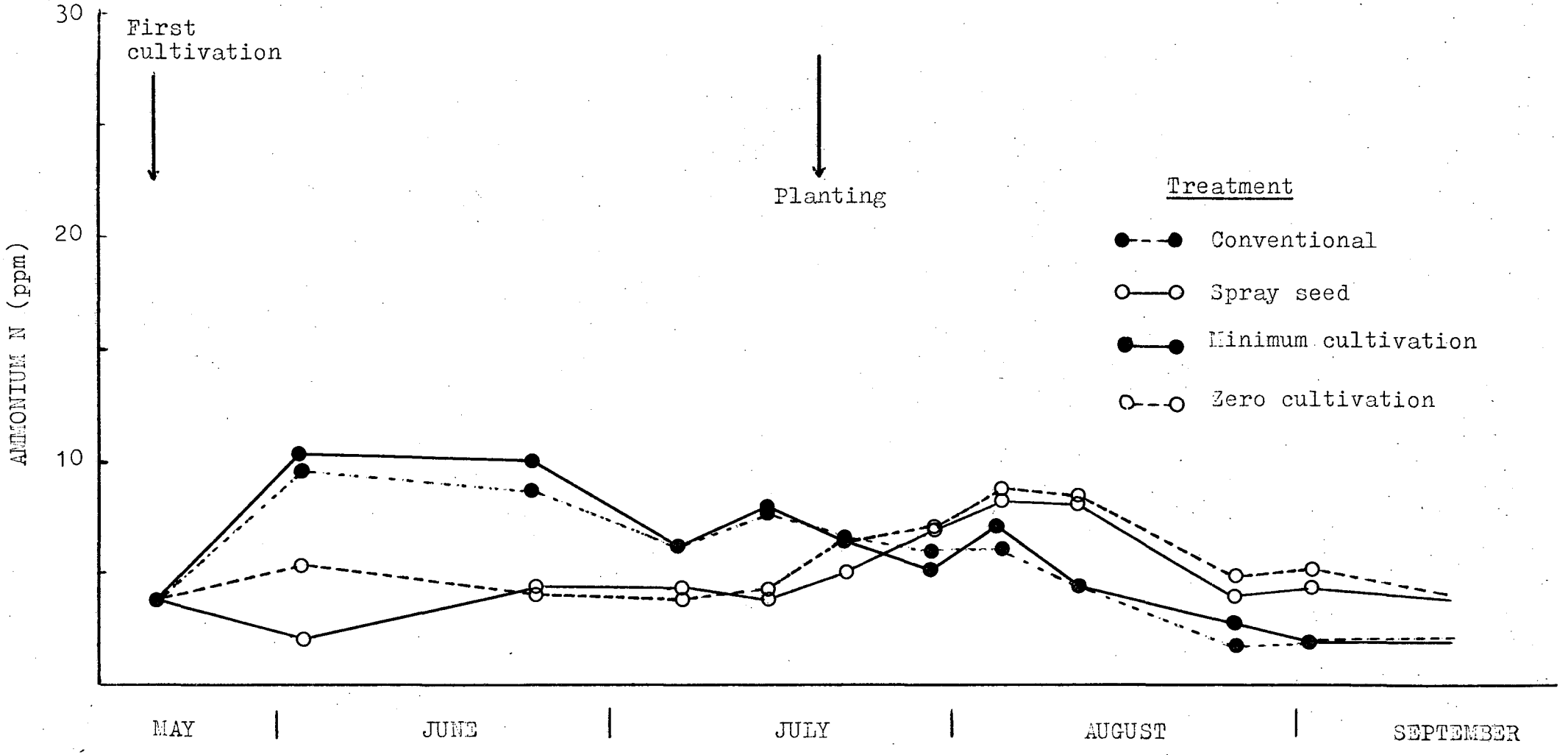
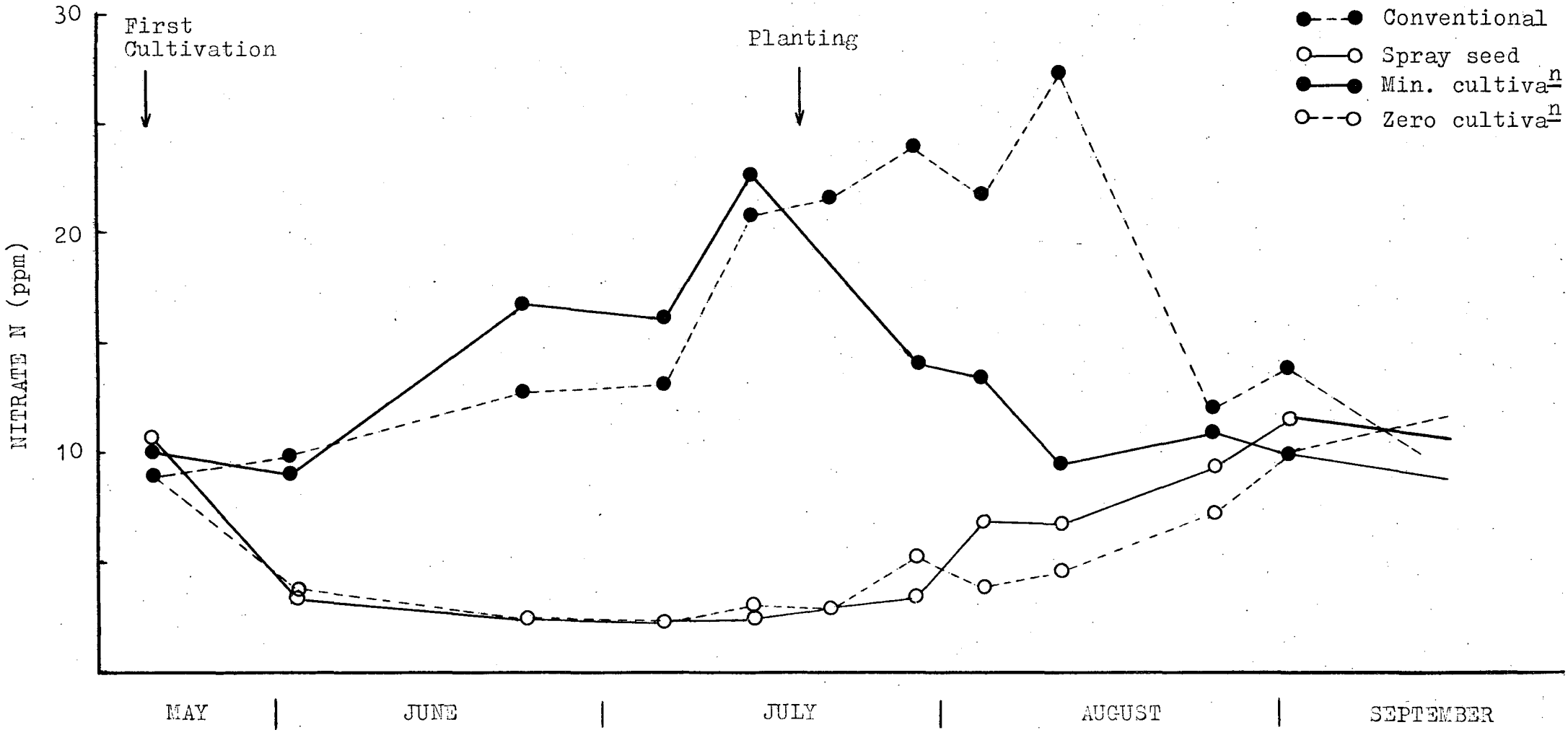


FIGURE 1a. 76NA41B - BODDINGTON Ammonium N at each time of sampling

FIGURE 1b. 76NA41B - BODDINGTON Nitrate N at each time of sampling



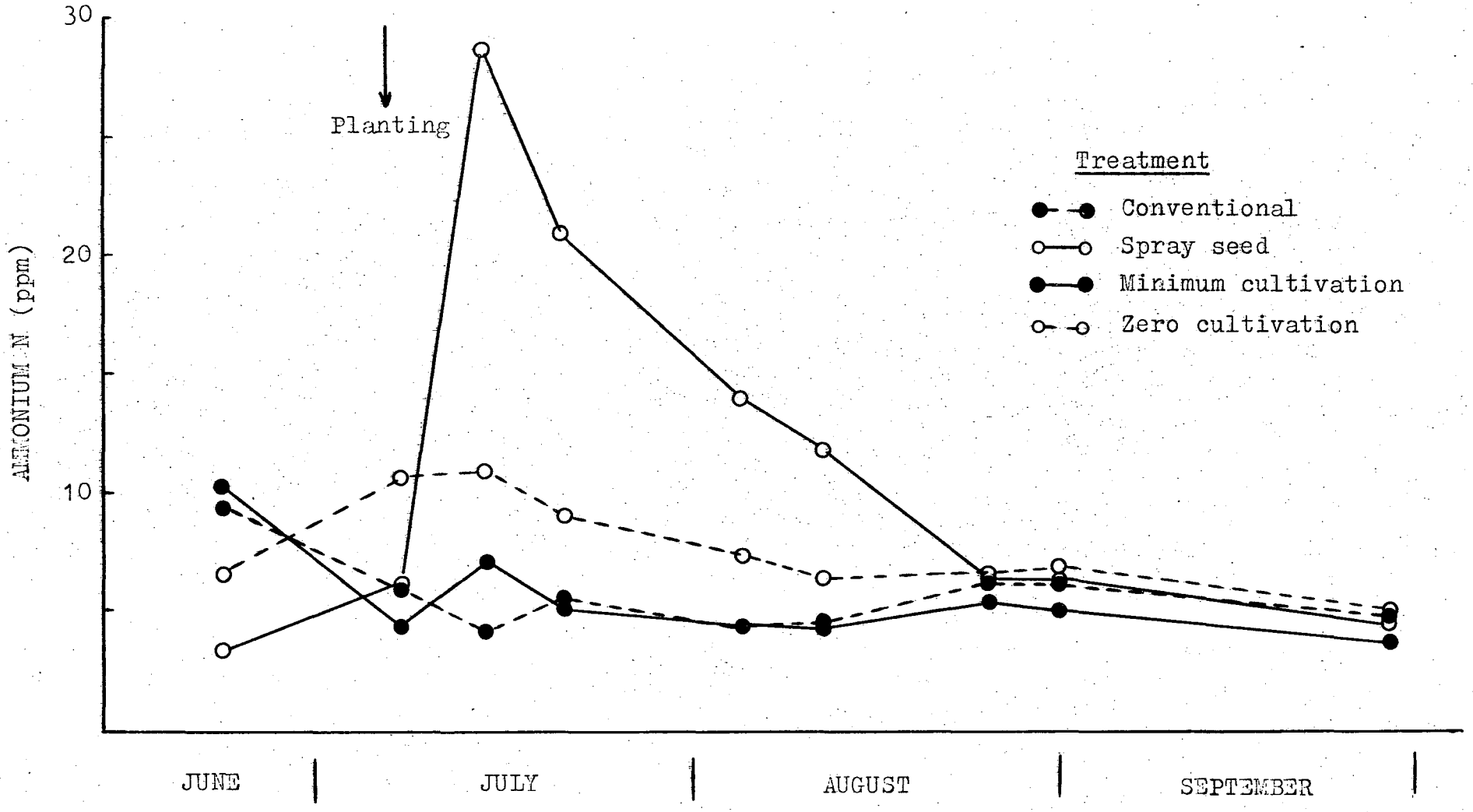


FIGURE 2a. 76AL32 - KENDENUP Ammonium N at each time of sampling

FIGURE 2b. 76AL32 - KENDENUP Nitrate N at each time of sampling