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Agronomy — Principles and Practice

The science of crop production, taught for real farms

Nji Griphan

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A note on this book

Agronomy is the science and practice of producing crops well: choosing what to plant, preparing the land, feeding and protecting the growing crop, and harvesting it at its best. It is a first-strength subject of this school and of my own teaching. This book builds agronomy from the plant outward — soil and climate, seed and sowing, crop care,

harvest — in the order a season itself unfolds.

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Chapter 1

What Agronomy Is

Agronomy joins plant science to farm practice. This chapter defines the field, names its working parts, and shows how the agronomist thinks: every decision is a meeting between a crop's needs and a place's conditions.

The crop and its environment

A crop's yield is written by its variety, the soil beneath it, the weather above it, and the management around it. Change any one and the result changes. The agronomist's first skill is reading a place — its rainfall pattern, soil depth and drainage, and season length — before recommending any crop or practice for it.

The growing season as a story

A season has acts: land preparation, sowing, establishment, vegetative growth, flowering, grain or fruit filling, maturity and harvest. Each act has its own critical needs — moisture at germination, nitrogen in early growth, calm weather at flowering — and its own disasters if those needs fail. Plan the season as a story whose crises you already know.

Yield and its components

Yield is built from components: plants per area, productive parts per plant, and weight per part — grains per cob and weight per grain, pods per plant and seeds per pod. Diagnosing a low yield means finding which component failed, and each component points to a different act of the

season and a different remedy.

The agronomist's notebook

Agronomy advances by records: sowing dates, varieties, inputs, rainfall, pest sightings, yields per plot. Without records, every season's lessons evaporate and the same mistakes are replanted. Keep the notebook in the field, not in memory, and review it before planning the next season.

Key points

- Yield = variety × soil × weather × management.
- Each growth stage has its own critical needs.
- Diagnose low yield by its components.

Exercises

1. Read one real field: describe its soil, drainage and season in ten lines.
2. For maize, name the yield components and the stage at which each is set.
3. Start a field notebook page for a crop you know.

Chapter 2

Soil and Land Preparation

The seedbed decides establishment, and establishment caps the season. This chapter covers tillage choices, seedbed quality, and matching land preparation to soil, slope and the farmer's resources.

What tillage is for

Tillage buries residues and weeds, loosens the surface for roots and rain entry, and levels the seedbed. It is a means, not a ritual: where residues can be managed and the surface is already fit, reduced tillage saves labour, fuel and soil moisture — and on slopes, saves the soil itself.

The fine, firm seedbed

Seeds need contact with moist soil and a surface fine enough for the shoot to escape, yet not powdered — powder crusts after rain and traps seedlings beneath. Judge a seedbed by walking it: your boot should mark it, not sink or skate.

Timing the preparation

Prepare land so sowing can follow the rains' true start, not their first teasing shower. Early preparation on dry soil stores labour; late preparation in a rush wastes the season's best moisture. The calendar, the sky and the soil's feel outvote any fixed date.

Slopes and fragile soils

On slopes, every tillage line is a water decision: work along the contour so furrows hold water instead of conducting it downhill. On fragile, sandy or shallow soils, disturb as little as possible and keep cover — the soil you keep is the yield you keep.

Key points

- Tillage serves the seedbed; it is not a ritual.
- Fine, firm, moist contact — that is a seedbed.
- On slopes, tillage lines are water lines: follow the contour.

Exercises

1. Judge two seedbeds by the boot test and report.
2. List the costs and benefits of reduced tillage on one farm.
3. Plan land preparation dates against a rainfall calendar you know.

Chapter 3

Seed, Varieties and Sowing

The cheapest yield is bought at sowing: good seed of a fitting variety, placed at the right depth, spacing and moment. This chapter treats seed quality, variety choice and the geometry of planting.

Seed quality

Good seed is true to its variety, clean, undamaged and alive — tested for germination before the season, as the sustainable systems volume teaches. Dead seed sown perfectly is still a failed stand; no later care resurrects it. Test every lot, every season.

Choosing varieties

Match the variety to the place: maturity length to the season's length, resistance to the diseases the place is known for, and quality to the market or the pot. The newest variety is not automatically the fitting one; local trial results outrank distant advertising.

Rate, depth and spacing

Seed rate sets plant population; depth sets emergence speed and evenness — too deep exhausts the seedling, too shallow dries it. Spacing balances each plant's room against the field's total capture of light and water. Follow the crop's recommended geometry, then adjust by evidence from your own plots.

Sowing with the rains

Sow when the soil moisture can carry the crop to the rains' establishment, and stagger sowing dates where labour or risk advises. A week lost at sowing is rarely recovered later; the season's clock starts at the first true rain, not at the farmer's readiness.

Key points

- Test germination of every seed lot, every season.
- Fit the variety to the place, not to the advertisement.
- Rate, depth and spacing set the season's ceiling.

Exercises

1. Run a 100-seed germination test and report the percentage.

2. Compare two varieties of one crop against your place's conditions.

3. Calculate the seed needed for one hectare at a stated rate.

Chapter 4

Feeding the Crop — Nutrients in Practice

Crops eat elements, not brands. This chapter teaches nutrient thinking: what plants need, how deficiencies announce themselves, and how organic and mineral sources are combined with judgement.

The essential elements

Nitrogen drives leaf and growth, phosphorus roots and ripening, potassium strength and water regulation — the big three — with a supporting cast including sulphur, calcium and trace elements. A shortage of any one caps yield regardless of the others' abundance: the barrel's shortest stave sets the water line.

Reading deficiency signs

Plants testify: nitrogen hunger yellows older leaves first; phosphorus shortage purples and stunts; potassium scorches leaf edges. Signs guide suspicion, not certainty — confirm with soil tests where available and with small trial strips before spending on a whole field.

Sources, combined

Manure, compost and legumes feed the soil's life along with the crop and release nutrients steadily; mineral fertilisers deliver precise amounts at precise moments. Agronomy combines them: a base of organic matter, mineral supplements aimed at the diagnosed lack, timed to the crop's hunger.

Timing and placement

Nutrient applied before the crop can take it is nutrient donated to weeds, water and air. Split nitrogen applications — at planting and at the crop's rapid growth — and place fertiliser near the root zone, not on the surface path of the next storm.

Key points

- The scarcest nutrient caps the yield.
- Deficiency signs raise suspicion; tests and trials confirm.
- Combine organic base with aimed mineral supplements, timed and placed.

Exercises

1. Describe the deficiency signs of nitrogen, phosphorus and potassium from memory.

2. Design a trial strip to test whether phosphorus limits a field.

3. Plan a split nitrogen schedule for maize on one hectare.

Chapter 5

Protecting the Crop — Weeds, Pests and Diseases

A crop shares its field with competitors and enemies. This chapter builds protection on knowledge: the critical periods, the thresholds for action, and control in layers — cultural first, chemical last and precise.

Weeds — the critical period

Weeds hurt most in the crop's first weeks, when the young crop cannot yet shade them. Keep the field clean through that critical window and later weeds cost little. Weed by timing, not by panic: two well-timed weedings outwork four late ones.

Pests and their thresholds

Not every insect is an emergency. Scout regularly, identify what is actually present, and act when numbers pass the level where damage costs more than control. Blanket spraying on a calendar kills the predators that were controlling your pests for free — and bills you for the privilege.

Diseases and their triangles

Disease needs a susceptible host, a present pathogen and a favourable environment — remove any corner and the triangle collapses. Resistant varieties, clean seed, rotation, spacing for airflow and field hygiene are the agronomist's first medicines.

Chemicals with discipline

Where chemicals are justified: the right product for the identified problem, at the label dose, with protective equipment, stored safely, and never in food containers. The label is a legal and safety document, not a suggestion — read it as you would a prescription.

Key points

- Protect the critical early weeks against weeds.
- Scout and use thresholds; spare the predators.
- Break the disease triangle at its weakest corner.

Exercises

1. For one crop, state its critical weed period and a weeding plan.

2. Write a scouting routine for a field: how often, what to record.

3. Draw the disease triangle for a disease you know and mark your attack point.

Chapter 6

Harvest and Yield Assessment

The season's truth is told at harvest. This chapter covers harvest timing, honest yield measurement, and the season review that turns one year's result into the next year's plan — handing over, at the field's edge, to post-harvest technology.

Harvest at maturity

Harvest too early and grain is immature and light; too late and weather, pests and shattering steal it. Learn each crop's maturity signs — colour, hardness, moisture feel — and judge by the field's bulk, not its earliest corner.

Measuring yield honestly

Weigh, do not guess: harvest measured plots, thresh and weigh the produce, correct for moisture where the standard requires, and scale to the hectare with the arithmetic shown. An honest yield figure — even a disappointing one — is an asset; a flattering estimate is a debt.

The season review

Sit with the notebook: which variety, date, rate and practice earned their place? Which failed, and at which yield component? Write next season's three changes before this season's lessons fade — the same discipline the farming systems volume teaches, now in the agronomist's own hand.

From field to store

Harvest is a handover: what happens next — drying, threshing, storage, processing — decides how much of the field's yield becomes food. That is the subject of this school's post-harvest technology volume, the companion standing beside this book in the Library.

Key points

- Harvest at true maturity, judged on the field's bulk.
- Weigh measured plots; show the arithmetic.
- Review the season in writing before planning the next.

Exercises

1. Estimate then weigh a plot's yield; report the gap honestly.

2. Write a season review for a crop you know: three keeps, three changes.

3. List a crop's maturity signs in order of reliability.

Appendix — Worked Examples and Practice

From Chapter 1 — What Agronomy Is

Worked example: two maize plots yield alike, but for opposite reasons — one has many small cobs (plants plenty, filling poor: late-season water or nitrogen failed), the other few large cobs (establishment failed: poor seed or late sowing). Same yield, different diseases of management, different cures. Components turn 'low yield' from a complaint into a diagnosis.

From Chapter 2 — Soil and Land Preparation

Worked example: a farmer ploughs up-and-down a gentle slope 'to finish faster'. The first storm runs in the furrows, carrying seed and topsoil to the field's foot — the top yields thin, the foot drowns. The same field worked on the contour holds the storm where it fell. Direction, not effort, was the whole difference.

From Chapter 3 — Seed, Varieties and Sowing

Worked example: maize at 53,000 plants per hectare with 85 per cent germination needs 53,000 ÷ 0.85 ≈ 62,400 seeds sown. At roughly 3,300 seeds per kilogram, that is about 19 kg of seed per hectare. The arithmetic takes two minutes and prevents the two classic errors: the thin stand and the wasted bag.

From Chapter 4 — Feeding the Crop — Nutrients in Practice

Worked example: a field receives generous nitrogen yet yields poorly, with purple, stunted plants — the signature of phosphorus shortage. The barrel's shortest stave was phosphorus all along; the nitrogen money was spent raising a stave that was not the lowest. Diagnosis before purchase would have reversed the spending.

From Chapter 5 — Protecting the Crop — Weeds, Pests and Diseases

Worked example: a farmer sprays a calendar insecticide weekly. By mid-season, freed from their predators, a minor pest explodes into the field's worst outbreak in years. The neighbour who scouted and sprayed once, at threshold, harvests more at a tenth of the chemical cost. Protection is knowledge applied at the right moment, not volume applied at every moment.

From Chapter 6 — Harvest and Yield Assessment

Worked example: a 5 m × 5 m plot yields 11.5 kg of dry grain. Per hectare: 11.5 × (10,000 ÷ 25) = 4,600 kg/ha. The farmer who 'felt' the field was about six tonnes now owns a true figure — and a question worth a season's thought: where did the other 1,400 kg go?

Further Practice — Review and Discussion

Work through these prompts in writing; they are the revision spine of this book. Answer in full sentences, with examples from your own place of study wherever the prompt allows.

Chapter 1 — What Agronomy Is

- Explain in your own words, with one example: Yield = variety × soil × weather × management.
- Explain in your own words, with one example: Each growth stage has its own critical needs.
- Explain in your own words, with one example: Diagnose low yield by its components.

Discussion: where does the subject of this chapter — what agronomy is — touch your own community, farm, school or workplace? Write one page, naming real places and real constraints, and end with one question you would research next.

Chapter 2 — Soil and Land Preparation

- Explain in your own words, with one example: Tillage serves the seedbed; it is not a ritual.
- Explain in your own words, with one example: Fine, firm, moist contact — that is a seedbed.
- Explain in your own words, with one example: On slopes, tillage lines are water lines: follow the contour.

Discussion: where does the subject of this chapter — soil and land preparation — touch your own community, farm,

school or workplace? Write one page, naming real places and real constraints, and end with one question you would research next.

Chapter 3 — Seed, Varieties and Sowing

- Explain in your own words, with one example: Test germination of every seed lot, every season.
- Explain in your own words, with one example: Fit the variety to the place, not to the advertisement.
- Explain in your own words, with one example: Rate, depth and spacing set the season's ceiling.

Discussion: where does the subject of this chapter — seed, varieties and sowing — touch your own community, farm, school or workplace? Write one page, naming real places and real constraints, and end with one question you would research next.

Chapter 4 — Feeding the Crop — Nutrients in Practice

- Explain in your own words, with one example: The scarcest nutrient caps the yield.
- Explain in your own words, with one example: Deficiency signs raise suspicion; tests and trials confirm.
- Explain in your own words, with one example: Combine organic base with aimed mineral supplements, timed and placed.

Discussion: where does the subject of this chapter — feeding the crop — nutrients in practice — touch your own community, farm, school or workplace? Write one page,

naming real places and real constraints, and end with one question you would research next.

Chapter 5 — Protecting the Crop — Weeds, Pests and Diseases

- Explain in your own words, with one example: Protect the critical early weeks against weeds.
- Explain in your own words, with one example: Scout and use thresholds; spare the predators.
- Explain in your own words, with one example: Break the disease triangle at its weakest corner.

Discussion: where does the subject of this chapter — protecting the crop — weeds, pests and diseases — touch your own community, farm, school or workplace? Write one page, naming real places and real constraints, and end with one question you would research next.

Chapter 6 — Harvest and Yield Assessment

- Explain in your own words, with one example: Harvest at true maturity, judged on the field's bulk.
- Explain in your own words, with one example: Weigh measured plots; show the arithmetic.
- Explain in your own words, with one example: Review the season in writing before planning the next.

Discussion: where does the subject of this chapter — harvest and yield assessment — touch your own community, farm, school or workplace? Write one page, naming real places and real constraints, and end with one question you would research next.

Glossary of Key Terms

Agronomy — The science and practice of crop production.

Yield components — The plant number, parts per plant and weight per part whose product is yield.

Critical period — The growth window when weed competition costs most yield.

Seedbed — The prepared soil surface into which seed is sown.

Threshold — The pest level at which damage costs more than control.

Disease triangle — Host, pathogen and environment — all three required for disease.

Maturity — The stage at which a crop is ready for harvest at best quality.

Trial strip — A small treated area compared with the untreated field to test a diagnosis.

End of book. Nji Griphan · griphan.48hourrfprescue.com · info@griphan.48hourrfprescue.com