

کھبہل گاس - Crowfoot Grass

Farmer-to-Farmer Conversation on Crowfoot Grass in a PQNK Field



Whenever a PQNK farmer mentions Crowfoot grass, people panic. They see it spreading and think it's a problem. But look around—nothing here is being harmed. Crowfoot only shows up where the soil is bare or compacted; it loosens the ground, then disappears on its own. We didn't sow it—nature did, right beside the water channel. Look at this mat of roots: I'm standing on it and you can feel how spongy it is. At least five to six inches of living 'foam' has formed. Now check the crop. Look at every plant in the orchard, not just one. They're fruiting, putting out new shoots, and the fruit itself is flawless—no insect scars, no shrivelling. I have never seen fruit of this size and quality under conventional farming. See this one in my hand? That's today's calibre—praise God. People worry the weeds will steal nutrients once we stop synthetic fertiliser, but the plants are thriving. There's no shortage at all because the microbes are turning those dead roots and mineral particles into plant food. I've closed the fertiliser shed; the field itself is now the fertiliser factory.

Crowfoot Grass - کھبل گاس

The plant commonly known as “کھبل” (Khabal Ghaas) in Urdu/Punjabi is known in English as Crowfoot Grass

English Name: Crowfoot Grass

Botanical Name: *Dactyloctenium aegyptium*

Description: It is a tough, drought-resistant grass.

- Commonly found in dry lands, roadsides, and farm boundaries in the Indian subcontinent.
- It is also used for forage, erosion control, and traditional medicine in some cultures.

Root System: Crowfoot grass has a fibrous root system.

Root Depth:

- Typically penetrates 15 to 45 cm (6 to 18 inches) deep in most soils.
- In loose or sandy soil, roots may extend up to 60 cm (2 feet) deep.
- It is known for being a surface-spreader, forming a mat of roots that grip the upper soil layer, making it useful in preventing erosion.

How Weeds and Roots Transform Soil Limitations into Assets

Soil Type	Problem	Weed/Root Solution	Measurable Benefit	Source
Compacted	Low porosity (<10% air)	Taproots (e.g., dandelion, dock) create macropores	↑ 50–300% hydraulic conductivity; bulk density ↓ from 1.5 → 1.2 g/cm ³	(USDA-NRCS, 2022)
	Poor microbial activity	Root exudates feed fungi/bacteria	↑ 20–40% microbial biomass; 2x faster organic matter accumulation	(Soil Biol. Biochem., 2021)
Sandy	Low water retention	Fibrous roots (clover, rye) form "mesh"	Water-holding capacity ↑ 3–5x; reduces leaching by 60%	(J. Hydrol., 2020)
	Nutrient leaching	Mycorrhizae bind sand particles	N/P retention ↑ 35–50%; crop-available nutrients ↑	(Nature Plants, 2023)

How Roots “Stitch-Up” Damaged Soil – a Farmer-Friendly Walk-Through

Think of bare, compacted soil as a torn piece of cloth: it's full of rips (cracks), pulled threads (collapsed pores) and holes (lost organic matter). Weeds are nature's emergency sewing kit. Their roots slide between the soil particles, re-open blocked pores, and leave behind organic “stitches” that hold water, air and nutrients in place.

Soil Is Really Just “Rock + Pores + Glue”		
Soil ingredient	Job in the field	What goes wrong when it's lost
Mineral grains (sand, silt, clay)	Skeleton that holds everything	Bare grains pack tight under rain & traffic
Pores (air gaps & water channels)	Highway for water, air, roots, microbes	Collapse → water puddles, roots suffocate
Glue (organic matter & root exudates)	Keeps crumbs loose but connected	Without plants, glue decays → crumbs fall apart

Roots = live re-bar

As roots wiggle through the mineral grains they push them apart, squirt out sugary exudates that stick crumbs together, and leave behind hollow straw-like channels when they die. Those channels become instant infiltration pipes for the next rainfall.

Why You Need Different Root Shapes?

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Root style	Example weeds / cover plants	What the root does	Soil problem it heals
Fine, fibrous net	Crowfoot grass (Khabal gass), quick grass	A tight carpet <15 - 40 cm deep that plugs the surface like a thatch, slowing evaporation and holding sand in place	Blowing sand, top-soil erosion, crusting
Medium "candle" taproot	Mustard, wheat, barley	Bores 40-60 cm, cracks hardpan, leaks exudates that feed microbes and loosen clay	Shallow compaction layer, waterlogging
Deep "bio-drill" taproot	Chicory, dandelion, pigeon-pea, Jantar	Shoots 1 m+ to open vertical shafts, mines deep minerals and lifts them to the top in its leaves	Tight sub-soil, drought-prone fields
Stolon / runner roots	Bermuda grass, purslane	Spreads sideways, arm-locking soil crumbs and shielding soil from sun	Bare, sun-baked patches

When all four root types grow together they form a three-dimensional root web:

- Top net slows rainfall splash and seals in moisture.
- Mid-layer roots punch lateral pores and feed soil life.
- Deep drills connect the water table to the surface.

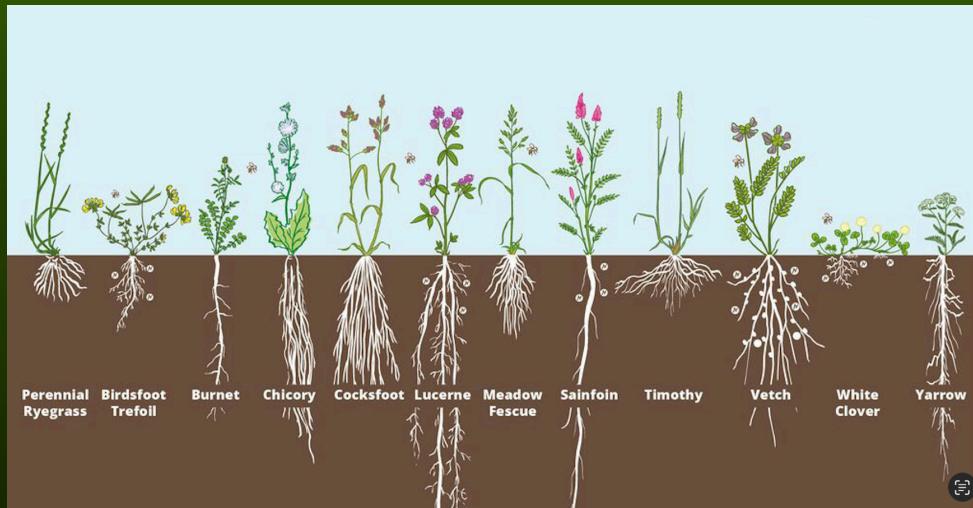
How It Works in Different Soil Textures

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Soil texture	What farmers see	How root diversity fixes it
Sandy (large pores, water drains fast)	"Rain disappears in an hour; plants wilt by noon."	Fibrous mats (e.g., crowfoot grass) knit grains together; exudates coat sand with biofilm that grabs water like a sponge. Taproots follow moisture downward and retrieve it later.
Loam (balanced)	"Gets crusty after heavy rain, but recovers."	Keep a living mix to maintain balance; roots renew pores faster than wheel traffic collapses them. Occasional mow but no bare fallow.
Clay / compacted	"Water stands, tractor ruts stay for weeks."	Bio-drill weeds crack the clay, roots pry open plates, dead roots leave vertical "pipes" for next rain. Surface fibrous weeds stop the clay from sealing again.

Weeds appear only where soil is bare or compacted—they are nature's first-aid crew. They open pores, supply organic matter, and leave once the soil sponge is rebuilt. Under a PQNK system, soil microbes turn those decayed roots and mineral particles into plant-available nutrients, so weeds are partners, not competitors, and every crop gets what it needs without scarcity.

Weeds: The Unsung Heroes of Soil Restoration

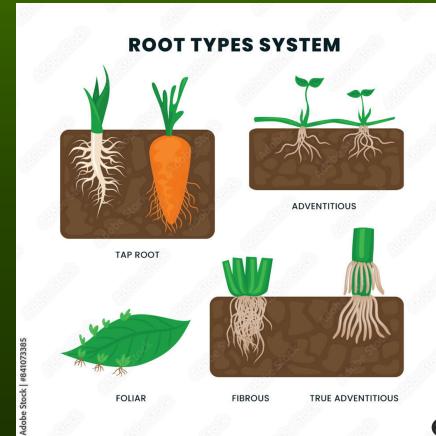
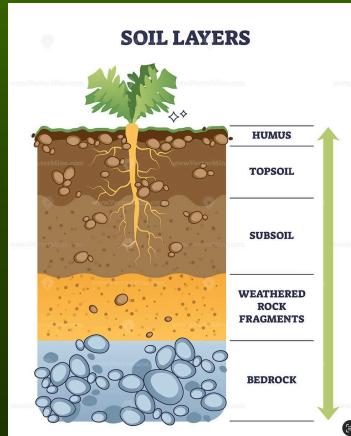
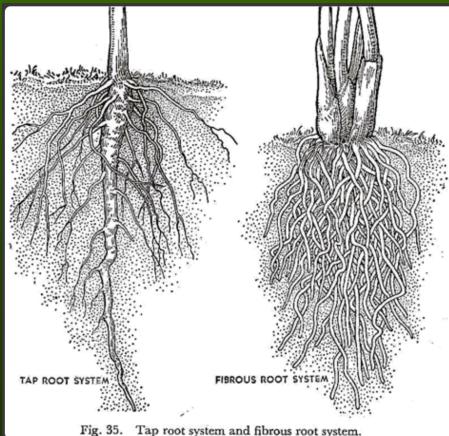
From Degraded Compacted Soil to Sandy Pores—How Weeds and Roots Heal the Land



Practical Tips to Harness (Not Fight) Weeds

1. Watch the indicator species
 - Crowfoot grass = soil wants a shallow fibrous net.
 - Pigweed / amaranth = soil gasping for deep cracks.
2. Mow, roll or graze – don't plough them under straight away:
 - Cutting leaves on top keeps the root mass alive long enough to finish the soil-repair job.
3. Follow with a seeded cover:
 - Mix cereals (fibrous), legumes (mid tap), and a couple of deep brassicas or radish (bio-drill).
4. Avoid continuous bare soil: Each month without living roots is a month of pore collapse and carbon loss.
5. Traffic smart: Run tractor tyres or livestock lanes in the same tracks; let the untrodden strips stay alive.

The Take-Home Story You Can Share



Every weed is a doctor for a different soil illness:

- Crowfoot stitches the surface blanket.
- Dandelion drills the drainage holes.
- Together they rebuild the sponge that soaks up rain, stores it, and breathes air to our crop roots.

Keep that living root diversity working 365 days a year, and your soil turns from hard brick or leaking sand into a soft, moist, crumbly cake ready for high-yield crops with no fertilisers, pesticides and less irrigation.

Turn weeds from enemies into unpaid soil engineers — and let the roots do the heavy lifting.