

From the Dirt flying out of the Soil Pits at the IRF:
ROOTS DO MAKE A DIFFERENCE!!

By: Michael Petersen, Agronomist

The magical number of three comes up a lot in science and here at the IRF we made three root observations in the Colorado Corn Growers root architecture studies. These root digs offer you a better set of clues how roots grow and provide water and nutrients to the corn crop. Right in the midst of eight seed company plots were Deere moisture probes and Earth-Tec® probes to better evaluate the root dimension of the corn crop along with the pits we excavated. All of us see from emergence to the seat of the combine what that corn plant does above ground. Here we aim to provide you a better understanding of the below ground aspect, and wow some differences are there.

We dug the first set of root observations June 24, then August 3rd and last dig was October 13th. Early season in June offers a look at how quickly we get nodal roots to extend themselves downward. Mid season depicts how well the roots have done when the plant set the number of kernels around on the cob and the number of leaves that it will have at reproductive stage. Last dig, how well did that plant do through R1-R4 and on to black layer? How well did the crop use the soil profile?

In this third year of complete crops of the CCGA study **Image: Getting the specifics on roots at CCGA plots** (2009 the IRF was totally hailed out), we see a continual depiction of root architectural differences from company A to Z, in all eight seed corn participants. Each rooting type is not to be construed that one is better than the other in some sort of competition here. Please look at this report and previous reports sponsored by CCGA that we are here to educate you on differences and for those of you making decisions on what to grow that fits your soil conditions, water management, water availability, fertility program, and style of farming.



It is our intention to offer you a better glimpse of the different root type’s capacity to extract water/nutrients from the soil profile in your field, was it able to handle the stresses of the summer months and to work within the limits of your water management scheme?

Colorado Corn Growers 2011 Results - Data Collected at Irrigation Research Foundation

Seed Corn Variety	Max. rooting depth (inches)	Depth to 85%		Cu. Inches of root/soil Vol.	Architectural Type
		of Roots - 85% Vol.	Vol at 85%		
Croplan	42	19	3750	4410	3
Dekalb	63	33	6720	7950	1
Mycogen	48	24	3852	3980	3
LG Seeds	54	23	2970	3845	3
Pioneer	60	32	5734	5950	2
Channel	63	36	4424	4220	1
Fontanelle	50	29	3050	3850	1
Golden Harvest	61	36	4760	5012	2

Note: all values taken at maturation

The column “depth to 85%” depicts the effective rooting zone throughout most of the summer months. True the roots go deeper, however the mass of roots amassed into this dimension is where the major source of nutrient activity and water uptake occur. The roots from the deeper depth will access water and bring it up into the zone between 12 and 24 inches for a period then move it throughout the above ground plant biomass. So it is very important to have the full picture. This has been observed in the water activity of the Earth-Tec® probes for two years in a row now at the IRF.

Consider this year’s root data, we believe the deeper root zone and rooting capacity for both populations in the 13inches+ water application rate gave the plant a fighting chance to maximize yield. In the lower water rate the deeper roots appeared to meet that argument too.

Below is the figure of the different rooting types that this study and 31 years of field root digs have revealed to Mike Petersen, Agronomist who was part of this project.

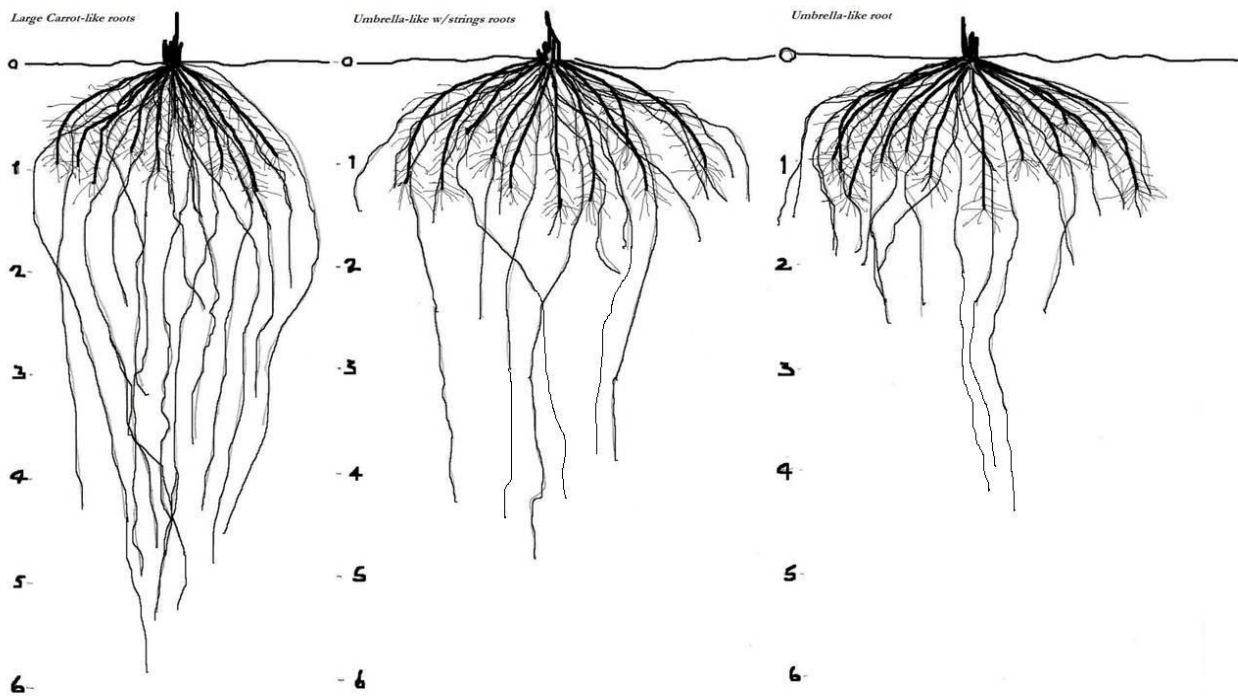


Figure 1. Architectural Rooting Types. Type 1 (far left), Type 2 (middle), and Type 3 (right side)

Summarization of 2011...

All of us at the IRF are sure that as we look into the future of irrigated agriculture on the Central Great Plains, corn is still the crop growers will plant on a great deal of acres. It takes water to grow corn either for silage or grain. The climate is very well suited (barring hail) to raise top yields with the warm sun, long days and cooler nights. The days of the 1970’s into the early 1990’s of pumping large quantities of water to produce top yields are out of the question. Can growers’ sustainable high and profitable yields with less than 12 inches of pumped water? What we have observed here over the past 10 years at the IRF is that answer is yes. However hybrid selection and matched populations are part of the equation to make it all come together. Conservation tillage programs must be in the equation and that has been a foundation piece of these studies every year of the CCGA trials.

We want to offer a great many thanks to the seed companies involved, the Colorado Corn Growers, Orthman Manufacturing, Monsanto for supplying the strong back of Jeff Tichota, Fontanelle and their efforts with the John Deere probes, Earth Tec Solutions, Inc. the fertilizer companies and a whole list of others.

An important note: The companies involved in this study gave the IRF specific maturation hybrids they felt fit the bill for the region of Eastern Colorado. Day length to maturation was across a range of 104 to 113 days.

2011

Colorado Corn Growers Assn.

Limited Water, Population, Root Development & Nitrogen Corn Study

Irrigation Research Foundation -- Yuma, CO Circle A

Pertinent planting, harvesting, fertilizer, & herbicide information is on previous page.

Rainfall during growing season: 7.77"

	<i>31,500 pop.</i>	<i>26,500 pop.</i>	<i>26,500 pop.</i>	<i>21,500 pop.</i>
	13.75" applied	13.75" applied	7.18" applied	7.18" applied
Croplan/6286SS/113	197.60	191.58	187.38	170.51
Mycogen/2A551/104	213.85	218.45	163.41	198.61
LG Seeds/2544/105	198.02	204.88	180.86	183.00
Pioneer/35F44/105	213.93	211.71	200.44	199.52
Channel/209-85VT3/109	212.58	214.54	175.18	176.49
Dekalb/55-44/105	211.06	212.23	177.62	180.51
Fontanelle/7T630/110	201.98	208.57	166.44	168.45
Golden Harvest/8254/106	219.03	193.28	168.60	170.19

Type 1 Type 2 Type 3

